

AUTOMOTIVE INDUSTRIES

Vol. 54
Number 24

PUBLISHED WEEKLY AT CHESTNUT AND 56TH STREETS
PHILADELPHIA, JUNE 17, 1926

35c a copy
\$3.00 a year

Motor



Carte Blanche

"Here is the car we are going to build. Equip it with the right wheels."

Those are the "specifications" to which Motor Wheel works for many of the greatest automobile manufacturers.

Motor Wheel designers, in many instances, not only have *carte blanche* on wheels, hubs, and rims, but their recommendations influence tires, steering, springing, and related matters.

In this way the car builder—using wood wheels, steel wheels, or both—draws upon the talent, initiative and understanding which make Motor Wheel the greatest source of wheels in the world.

**MOTOR WHEEL CORPORATION
LANSING, MICHIGAN**

WOOD WHEELS • STEEL WHEELS • STAMPINGS

Wheel



Throughout the entire field of transportation manufacturers are confronted today with new developments in internal combustion engines.

In every field of transportation—bus, truck, passenger car, industrial, aviation and marine—Continental Motors meet the requirements of the present day.

And Continental's 26 years experience in the building of a quality product is a sufficient guarantee of its ability to meet all power demands in the uncharted fields of the present and future.

CONTINENTAL MOTORS CORPORATION

Offices: Detroit, Mich., U. S. A. Factories: Detroit and Muskegon
The Largest Exclusive Motor Manufacturer in the World

Continental Motors

AUTOMOTIVE INDUSTRIES

VOLUME 54

Philadelphia, Thursday, June 17, 1926

NUMBER 24

Companies With *New Ideas* Show *Greatest* Sales Gains

Most conspicuous successes this year are being scored by manufacturers who have fresh engineering or marketing ideas to exploit. Little fellows are setting pace.

By Norman G. Shidle

THE companies which have materially bettered their sales performance this year as compared with their own records a year ago are not all industrial giants by a long ways. Some of the most striking advances in the last twelve months have been made by passenger car outfits which do a relatively small total business, but whose progress, measured in terms of their own past achievement, has been much more rapid and significant than that of some of the very large enterprises.

A number of the large organizations have done well, too, of course, but the progress of the smaller outfits indicates that success is due to merchandising abilities, engineering ideas and operating efficiency rather than to size alone.

The company with a new idea, the company that has really gone ahead and developed something out of the ordinary which warrants the interest and attention of the public almost always has been able to get the public's ear and eye and to reach the public's pocketbook. Some of the small companies have failed to do this; in such cases their sales records show up unfavorably as compared with the past. This type of small company probably will be overwhelmed by the competition of its big competitors.

It's an old saying and true that "a fast, big man can always beat a fast, little man." But a little, fast man almost always can outpoint—even though he may be unable to K. O.—a big, slow man.

Take a look at the records of new car sales for the first three months of 1926 as compared with the sales for the same months of 1925. Retail passenger car sales as a whole for the first quarter of this year were 17 per cent ahead of last year, according to reports from statistical agencies.

But four companies—all of them rather small as regards production and three of them generally considered relatively weak a few years ago—showed an increase as compared with last year of more than 100 per cent.

Now, of course, it's perfectly obvious that a small pro-

duction company by building very few cars can pile up a good percentage increase for itself, especially if its output last year was unusually small, while a big company like Ford or Chevrolet must increase its actual output by many thousands of cars if its percentage increase is to be noticeable. But just the same, the percentage increases for the small organizations do show that they are doing a lot better than they did before when measured by their own standards of performance.

A 220 Per Cent Increase

Take a company like Auburn, for example. In the first quarter this year, according to the reports received, it sold at retail something like 220 per cent more cars than in the first quarter of 1925—and its balance sheet indicates that the increased sales brought increased profits. Jordan has a high percentage increase in sales, while Stutz, according to the same compilations, went ahead some 55 per cent despite its inability to get a sufficient number of bodies for a part of the period covered by the figures. Really new ideas, merchandising punch and intelligent as well as intensive sales effort bring sure rewards in the automotive industry as everywhere else.

Turn for a moment to a big organization like General Motors and see how the same principles apply. Oakland and Oldsmobile, a few years ago relatively weak units in this strong General Motors chain, the first quarter of this year showed gains in new car sales of nearly 90 and 55 per cent respectively as compared with the same period in 1925. Both of these cars today are recognized as being successful; the term "weak-sisters" no longer is applied to them.

The recent successes of Oakland and Oldsmobile didn't come *merely* from their membership in a huge organization. They were members of the same huge organization when their records were less favorable. Their success came from the injection of new ideas into the product and merchandising drive behind it.

Many other similar examples can be cited among those companies whose 1926 records show them to be above the 17 per cent average increase over last year. Both big production and small production companies are in this group which has had more than the average success this year; but in practically every case really new ideas incorporated in the product plus rather outstanding merchandising activity is characteristic of the organizations' work in recent months. It is true, however, that in a few cases new ideas in the product are lacking; unusual marketing ability thus far has served to offset that lack.

One Pertinent Conclusion

But there are a number of companies, naturally, which this year have failed to increase over last year as much as the average. Looking over this list, one pertinent conclusion stands out:

Big companies with huge resources and long standing reputations are almost as numerous in this "below the average list" as small organizations of more recent incorporation or of less general prominence in the field.

New ideas, ability to think ahead constantly, plus careful, efficient sales operation are the keystones of automotive manufacturing success. Size alone is not the controlling factor, although it does, of course, have a definite bearing on certain aspects of the case.

The cry is heard that the small, less-known manufacturer can never hope to get firmly established because all the good dealers, in smaller towns particularly,

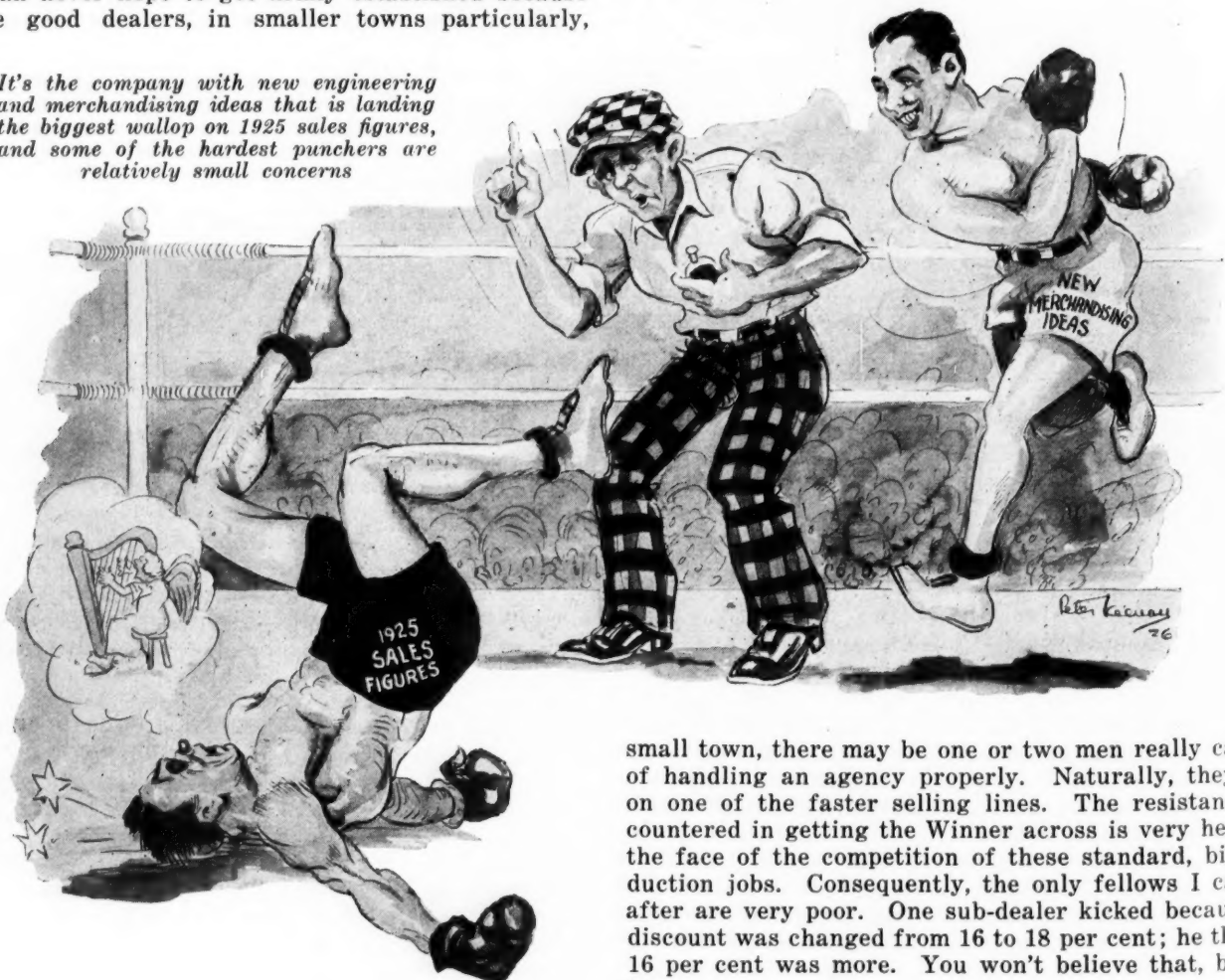
tributor said to us the other day—not apropos of this subject.

This distributor is located in a city of nearly a million population. He handles one high priced line, which we'll call the "Stanford" for convenience, and a car selling for less than \$1000—we can call it the "Winner." The Stanford the first of this year brought out an entirely new car, different not only from past Stanford models but definitely different in many important aspects of design and performance from other cars of its class. But the Stanford has not been considered a leader in the past. The winner about four years ago announced a design feature unusual even in cars of higher price which is quite probably of greater mechanical than merchandising value, but since that time has done little of a striking nature either in design or merchandising. This distributor has been very successful and has made excellent profits both for himself and his factories. Here's part of what he said in a casual conversation.

"Yes, I've decided to give up the Winner the end of next month. By doing so I can cut my overhead about \$1800 a month and I think that by concentrating all of my organization's time and enthusiasm on the Stanford we'll make more money in the long run.

"No, I haven't a thing to say against the Winner. It's as good a little car as you could want in that price class. Mechanically it's all right. But I've just become discouraged with the difficulty of getting dealers. In a

It's the company with new engineering and merchandising ideas that is landing the biggest wallop on 1925 sales figures, and some of the hardest punchers are relatively small concerns



naturally will take on a better known line which meets with less sales resistance. That statement has many alluring qualities, but it shouldn't be accepted as truth too readily. Instead of talking around this point in an argumentative way, suppose we repeat what a big dis-

small town, there may be one or two men really capable of handling an agency properly. Naturally, they take on one of the faster selling lines. The resistance encountered in getting the Winner across is very heavy in the face of the competition of these standard, big production jobs. Consequently, the only fellows I can get after are very poor. One sub-dealer kicked because his discount was changed from 16 to 18 per cent; he thought 16 per cent was more. You won't believe that, but it's true.

"What can you hope to do with that sort of dealer. You can't educate him. There's nothing to start on. And it's hard to get the kind of dealers we need for the Winner.

"The Stanford? That's a cinch, now. I've stuck with

the Stanford outfit through about 10 years of grief; I've made some money out of the job, but I've sunk a lot in it also. This year they gave me something to sell—and it's selling well, I can tell you. It's been easy to increase our dealer force on the Stanford ever since this new job came out. We're getting good men, too. It looks like we're all set for the future with Stanford."

What is the net result of this distributor's statement? He is giving up one line because he says that the competition of other lines makes it too hard to get dealers.

But he is keeping and is enthusiastic about keeping another line which on its performance in the last ten years hasn't any better reputation nor general prestige even if as good as the line he is giving up.

What's the answer?

The Stanford has put into its job really new ideas, new merchandising effort and has taken a step ahead of the general procession. These things have made it easy to sell and have made dealers relatively easy to obtain in spite of the competition of better established and better known lines. The Winner hasn't put over a real

fast one for four years and consequently is finding it more and more difficult to fight off the power of reputation and standing of the bigger companies.

But the trouble with the Winner, so far as this distributor is concerned, is not really that the other lines are built by big companies; the trouble is that the Winner—while quite a satisfactory product—has done nothing to make itself an outstanding product in the last few years.

The problem faced by Ford has been discussed so much in recent months as to be common knowledge in the industry. That size, after a certain point has been reached, no longer brings increased selling advantages, has been recognized for some time.

Big or little—new ideas and merchandising drive are necessary to success. It will be a very long while before anybody in the automotive industry reaches a point where he can ride safely for very long in the Rut of Reputation. There will always be room for the smaller fellow who has merchandising brains and knows how to use them.

Operators Waste 80 Per Cent of Trucks' Usefulness

TIME studies covering a large number of installations throughout the country show that the average performance of a motor truck under load is four hours or less per day, six days a week, 280 days a year, while the vehicle is capable of working 20 hours a day over the same periods. The reason why ordinary truck operation is thus only about 20 per cent of its continuous performance ability was given by H. W. Howard, General Motors Truck Co., as being almost entirely operating inefficiency of the truck organization.

In a paper delivered before the annual convention of the American Iron, Steel and Heavy Hardware Association held recently at Atlantic City, Mr. Howard expressed the belief that present motor truck operating costs were much too high and that they were almost entirely due to improper use of the trucks resulting from lack of information concerning their movement.

He suggested that time studies be utilized in order to determine just what proportion of the time that a truck is out of the garage is spent in actual profit paying operation so that unproductive time may be eliminated wherever possible. Six factors were given which, Mr. Howard said, were usually of most importance in determining the amount of unproductive time. These are: Type and size of vehicle; loading and unloading conditions; type of body and auxiliary equipment; routing and dispatching methods; cost records; maintenance methods.

Mr. Howard believes that much of the present inefficient operating methods to be found in the motor trucking industry are caused by the gradual transition from horse-drawn vehicles to motor vehicles without a proper realization on the part of the owners that the two forms of transportation are quite different and require altogether different operating methods in order to be most effective.

Not as much attention has been given by operators to bettering methods of using trucks as has been given by manufacturers in their construction. Good trucks do not necessarily mean superior transportation and within recent years manufacturers have become interested in the problem of aiding owners of their products to get the most useful and profitable service from them since service records are strong factors in making new sales.

In choosing equipment for a particular service, Mr. Howard stated that there was a very definite line between the horse-drawn or electric truck, and gasoline propelled vehicles. The former are peculiarly suited for short-haul, frequent-stop work but because of their limited speed and range of operations they cannot compete with gasoline vehicles in any other field.

The line between the horse and the electric vehicle is not so clearly defined, Mr. Howard said, but a horse-drawn vehicle will usually show a slight indicated saving when the daily mileage is not over eight or ten. In such cases most of the time of the working day is spent in loading, unloading or traversing congested traffic. If these factors can be improved, as the first two certainly can be, the daily mileage of the vehicle can be increased considerably and then the electric truck will show a considerable saving over horse-drawn vehicles.

Horse Vehicles Hinder Traffic

As to the last factor—that of traffic congestion—Mr. Howard said that the fact that the horse-drawn vehicle itself contributes a great deal to it will be an influencing argument for the eventual elimination of such vehicles from congested centers. The average horse-drawn vehicle of five tons capacity occupies about 275 sq. ft. while a motor truck of similar capacity occupies only about 175 sq. ft. This additional demand on precious road space by horse-drawn vehicles is further aggravated by the fact that they move so slowly as to intensify congestion.

The fact was mentioned that there is at present a campaign on foot to eliminate horse-drawn vehicles entirely from the main city streets of London. A short time ago, in New York City, the American Express Company replaced 138 wagons and 330 horses with 84 electric trucks. In so doing they saved 48,000 sq. ft. of floor space in a location where a conservative estimate of the value of such space is \$2 per sq. ft. Not only was floor space saved by the change but a most valuable saving was made in street space occupied by the company's delivery trucks. The horses and wagons eliminated would cover about 16½ city blocks of streets while the electric trucks replaced them would cover about 7 blocks only.

Six-Cylinder, Two-Stroke Oil Engine Built for Bus Service

Powerplant of double piston type designed to develop 125 hp.
at 1200 r.p.m. Has $3\frac{1}{2}$ in. bore and $7\frac{1}{4}$ in. stroke.
Intake and exhaust ports unusually large.

By P. M. Heldt

AFTER having tried out certain principles in engine operation in a single cylinder experimental oil engine, to which reference was made in our Engineering Number last week, the Maedler Engine Corporation, of Cleveland, Ohio, is developing a six-cylinder 125 hp. bus engine designed to carry its rated load at 1200 r.p.m. The new engine also works on the two-stroke principle and uses the same method of fuel injection as the single cylinder, but differs from it in many other respects.

As shown by the cross-sectional view herewith, the new engine is of the double piston type. This design was

chosen because it was felt that it afforded all the advantages of the previous sleeve valve design and, in addition, would make possible a higher thermal efficiency. The bore of this engine is $3\frac{1}{2}$ in. In order to equalize the inertia forces on the upper and lower sets of reciprocating masses, the strokes of the two pistons are made unequal, that of the upper one being $3\frac{1}{4}$ in. and that of the lower one 4 in. Thus the effective cylinder dimensions are $3\frac{1}{2}$ by $7\frac{1}{4}$ in. and the engine has a piston displacement of 418.5 cu. in.

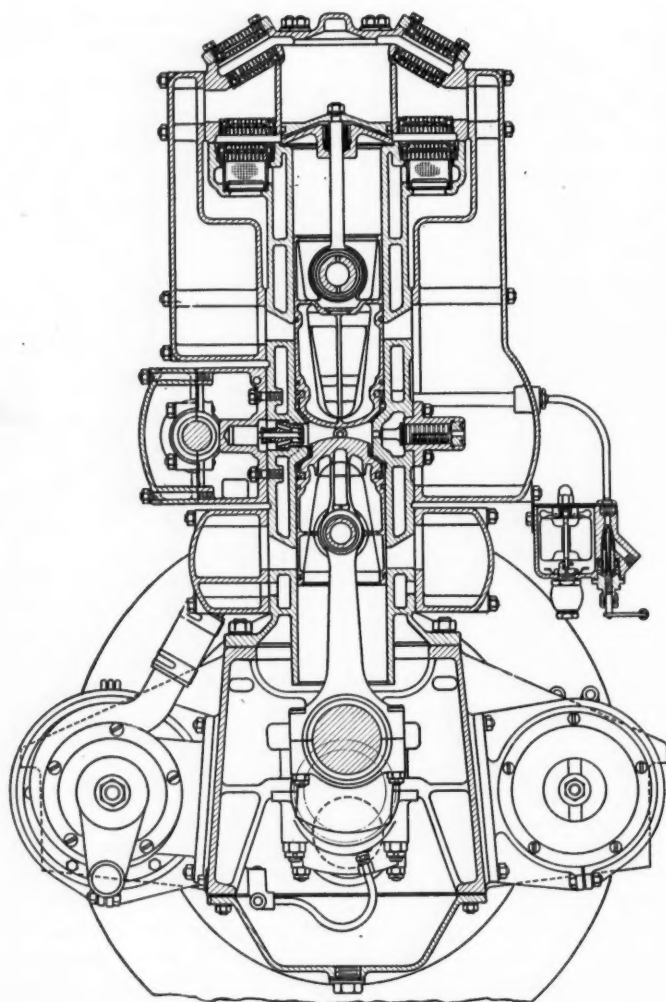
Like the single cylinder, the new engine works on the two-stroke principle, and the scavenging pump necessary with such engines is of the piston type and forms an extension of the engine cylinder on top. Its piston is secured by a piston rod to the piston pin of the upper power piston. The advantages expected from the double piston construction are summarized in the following paragraphs.

The upper piston controls the intake and the lower the exhaust ports; this permits of the use of ports of exceptionally large area, extending nearly all the way around the cylinder, and ensures uniflow scavenging. The scavenging air enters the cylinder at the top, while the dead gases escape at the bottom, hence a very thorough clearing of the cylinder of the products of combustion may be expected.

Compression Chamber Compact

An improvement in the thermal efficiency should result from the fact that the compression chamber is very compact and that none of its wall area is direct-water-cooled. In the ordinary engine a great deal of heat is lost to the water-cooled cylinder head. The piston head, being at a higher temperature, absorbs heat less rapidly, and this should improve the thermal efficiency. Another factor tending in the same direction is the comparatively rapid expansion, which gives the heat less chance to escape through the combustion chamber walls. At 1200 r.p.m. the piston speed of the lower piston is only 800 ft. p. m., but the sum of the speeds of the upper and lower pistons, which determines the rate of expansion, is 1450 ft. p. m.

Owing to the location of intake and exhaust ports at opposite ends of the cylinder, large ports can be used and a high volumetric efficiency obtained as a consequence. The volumetric efficiency is further increased by offsetting the cranks for the upper and lower pistons in such a way that while the exhaust ports are opened earlier than the intake ports or air ports, the two sets of ports close at the same time, whereas in the conventional two-stroke engine with piston controlled ports the inlet port closing leads the exhaust port closing by the same amount as the inlet port opening lags behind the exhaust port opening.



Cross section through six-cylinder Maedler oil engine for bus service

This retarded closing of the scavenging ports permits not only of exceptionally effective scavenging, but also of supercharging.

It is stated that the reason it has been impossible in the past to obtain high speeds in oil engines—and this apparently has particular application to the two-stroke type—is that it was impossible to get rid of the heat absorbed by the piston head in the short time available for the purpose. By using two pistons instead of a single one, the area of each piston head is decreased and the problem of properly cooling the piston is thereby made easier.

Inertia Forces Balanced

With two pistons moving simultaneously in opposite directions it is possible to completely balance the inertia forces, the greater weight of the top piston with its connected parts being compensated for by a reduced stroke. The two pistons in the engine under discussion, of course, do not move absolutely in opposition, but the offset seems to amount to only about 5 deg., so substantially the same effect is obtained. Of course, as regards balance of the engine as a whole, or vibrationless operation, it is difficult to improve upon the ordinary six-cylinder type, but by balancing or neutralizing the inertia forces active in each cylinder unit, the loads on the main bearings are reduced. Since the compressor forms an extension of the engine itself, no special compressor drive is needed.

The use of a comparatively small bore and long effective stroke results in light reciprocating parts, which permits of high engine speeds. The weight per hp. is expected to be quite low, largely on account of the use of the two-stroke principle and the comparatively high piston speed.

A form of combustion chamber is used which ensures a high degree of turbulence during the period of fuel injection. This was tried out on some of the later single cylinder engines built and is said to have given excellent results.

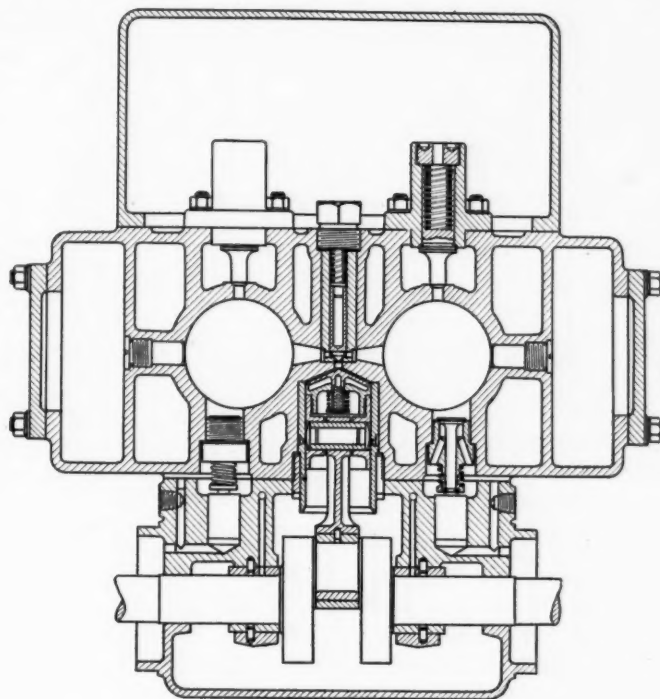
As may be seen from the cross section of the bus engine, the lower piston is reduced at the head end to about one half its full diameter and is provided on its circumference with a series of helical grooves. This reduced portion of the piston fits into the restricted central part of the cylinder bore with about 1/16 in. clearance. When the lower piston is still about 20 deg. ahead of the top dead center, its reduced top end enters the restriction in the cylinder bore. At that moment the bulk of the air charge is still contained in the large cylinder bore, and during the remaining period of the upstroke this air charge is forced through the helical grooves into the main combustion chamber, producing thereby a very effective "whirl" in the air charge in the combustion chamber proper. Shortly before the top dead center is reached the prepared fuel charge is injected into this whirling air charge, and this turbulence effect was found to increase the output of the single cylinder engine very materially.

Double-Acting Compressor

The scavenging air is supplied by a double-acting air compressor, mounted on top of each cylinder, and operated from the wrist pin of the upper piston. On the left side of the engine is attached a pressure relief valve for starting purposes, which is air-operated. On the right hand side is shown a safety valve which guards against any undue overloading of the engine by limiting the maximum combustion pressure to 600 lb. per sq. in. The location of the fuel pump is shown in the horizontal cross-section through the combustion chamber.

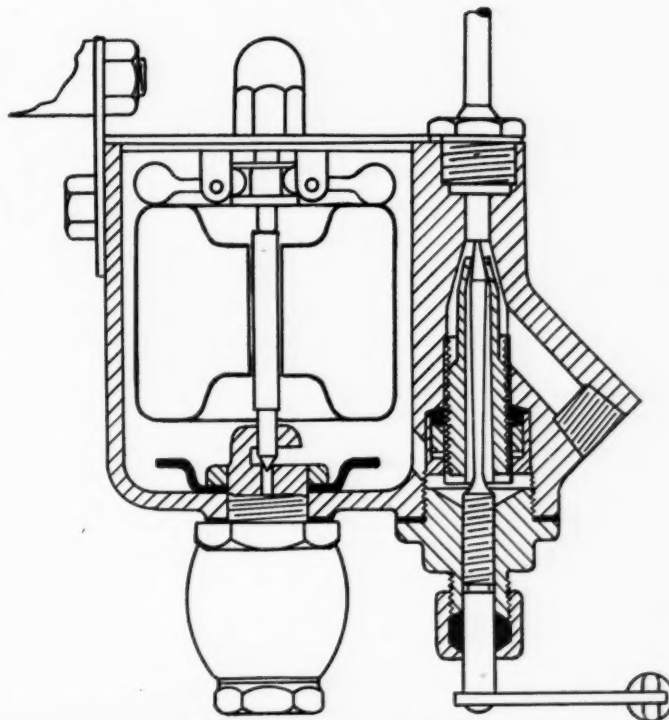
The operation of this engine is as follows:

During its down stroke the lower piston uncovers the exhaust ports (which are arranged circumferentially around the whole cylinder bore near the lower end) at 60 deg. before lower dead center. The pressure in the cylinder now drops to atmospheric pressure, and 15 deg. later



Horizontal section through cylinders of Maedler engine

the air ports are opened by the upper piston. Scavenging air under 5 lb. p. sq. in. pressure now rushes through these openings into the cylinder, pushing the remaining residual gases ahead of it, out through the exhaust ports. Besides thoroughly scavenging it, this operation fills the entire cylinder with clean air. Owing to the restriction in the center of the cylinder, setting up a momentary pressure dif-



Carburetor of Maedler engine

ference in the upper and lower halves, the so-called boring effect of the scavenging air is eliminated.

At 60 deg. past the lower dead center the exhaust and intake ports close, the desired timing being obtained by offsetting the crank-throws controlling the movements of the upper and lower pistons.

The fresh air charge is now compressed between the two pistons, while they move toward the center of the cylinder. About 5 deg. ahead of the point at which the maximum compression is reached, the fuel is injected into the hot and whirling air charge, and its combustion is very rapid. The time of fuel injection can be varied by the operator by mechanical means similar to those used for

advance or retardation of the spark on electrically ignited engines.

Starting is accomplished by means of an air starter. When the engine is turning over the fuel supply is turned on, and the compression of 350 lb. is ample to ignite the first charge even when the engine is cold. In fact, experiments have shown that regular firing could be obtained with 260 lb. compression.

The Maedler Engine Corp. has been developing these engines during a period extending over the past three years. The engine above described is being built under patents to F. L. Maedler, P. F. Hackenthal and William Jackson.

European Air Lines Are Losing Money

DATA on operating costs and other features of commercial air transport in England were given by Air Vice-Marshal Sir W. Sefton Brancker in the fifth Gustave Canet lecture before the Junior Institution of Engineers, recently. According to Sir Sefton, there are now 31,000 miles of organized air routes in operation throughout the world, and the total mileage flown last year was 14,382,000.

In spite of these imposing figures on the scale of operation, it had to be admitted that no line in Europe, at any rate, was self-sustaining, and that the service existed only through Government subsidies. The causes for the present lack of profits were analyzed and the conclusion was drawn that improvements which now seemed possible would in the near future place commercial air transport on a sound commercial basis and render it independent of Government support.

Civil aviation and commercial air transport began in England in May, 1919, and from that time to the end of 1925 thirteen paying passengers were killed and five injured as the result of accidents on the recognized British air lines. During 1925, of 4086 flights started, 58 or 1.4 per cent were not completed. In addition, 932 of the flights scheduled were not begun, for one reason or another. Proved safety and reliability naturally will contribute to the commercial success of air transport, but the measures taken to ensure safety and reliability often add to the operating costs.

As reported in *The Engineer*, the speaker placed the total cost of transport by air at about 5 s. per ton-mile at 90 miles an hour. This figure is very high for the transport of freight and passengers, and can be accepted as a legitimate charge only for the carriage of first-class mails at high speed. The predominant factors affecting the financial aspect of the problem are divisible as follows:—(a) Overhead charges, viz., interest on capital, obsolescence and depreciation, insurance; (b) operating costs, viz., maintenance of engines, maintenance of aircraft, fuel; (c) revenue, viz., paying load per horsepower and volume of traffic.

Dealing with the first item (interest on capital), Sir Sefton remarked that the most effective way of reducing its effect on the problem was to increase the work done by each unit of the fleet. In a well-organized air service a machine should be able to spend 2000 hours a year in the air on day flying. On the average, 1000 hours a year was today considered good.

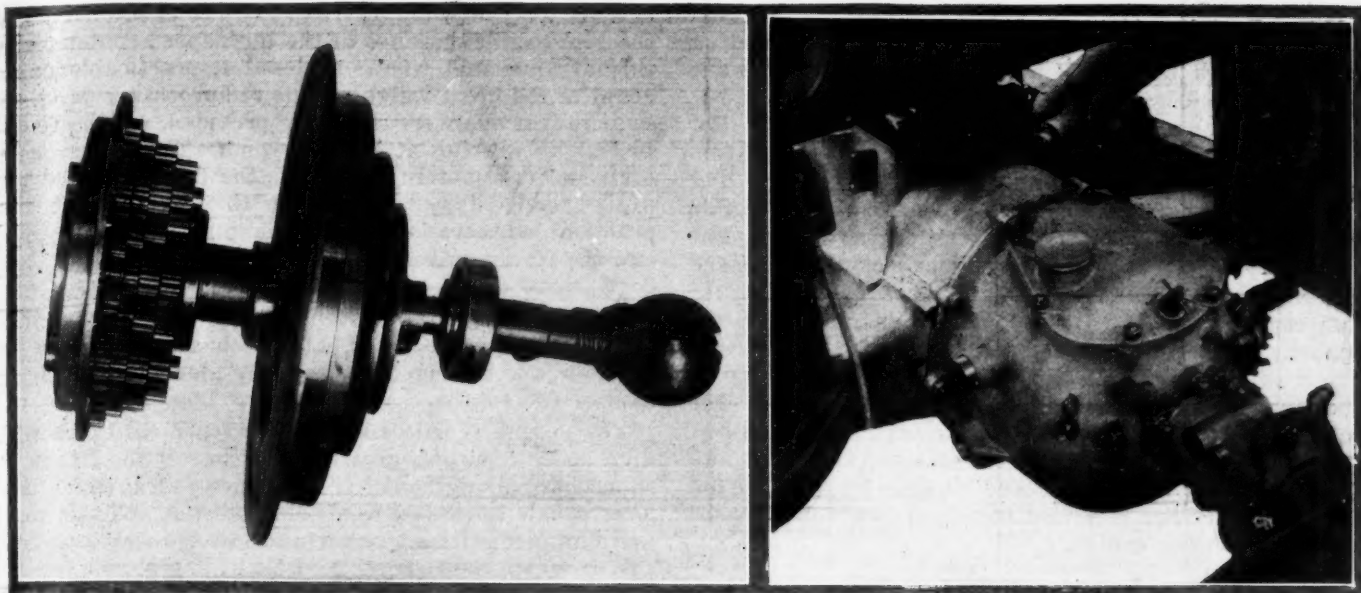
Depreciation could not as yet be assigned a fixed rate. It was not, however, nearly so serious a factor as obsolescence. The two together were frequently taken at 20 per cent per annum, but this rate was not sufficient to meet the constant flow of improvements in design.

Since 1919 two generations of aircraft and one of engines had passed away, not because they were worn out, but because they had become obsolete. Of all the factors affecting total cost, obsolescence offered the least promise of reduction in the near future.

Insurance was a heavy drain on the companies operating air services. The premiums were high, but they were less than the 20 to 30 per cent charged in the earlier years. Today they had settled down to 12½ to 15 per cent for single-engined machines, 8 to 9 per cent for twin-engined, and 7½ per cent for three-engined machines.

Turning to operating costs, the lecturer remarked that during 1925 these costs were distributed as follows:—Engine maintenance, 44 per cent; aircraft maintenance, 20 per cent; fuel, 30 per cent; miscellaneous, including flying pay, 6 per cent. Under engine maintenance, heavy expenditure was incurred in the purchasing of spare parts. The price of spares was roughly proportioned to the cost of the engine for which they were required. A standard water-cooled engine cost about £5 9s. per horsepower, while the latest type of air-cooled engine cost only £3 15s. per horsepower. The really heavy burden was, however, the number of man-hours expended on engine maintenance. Matters were improving in this respect. In 1924 a certain type of engine frequently ran 210 hours before requiring overhaul. Today this time had been increased to 250 hours, but a still better performance was required before real economy could be achieved. Analyzing the principal defects which led to the removal of engines from aircraft belonging to Imperial Airways in 1925, he stated that valve breakage accounted for 31 per cent of the total, defects in the water system for 20 per cent, failure of material for 19 per cent, deterioration of bearings for 12 per cent, defects in the oil circulating system for 10 per cent, and miscellaneous and indefinite defects for 8 per cent. Given patience, money, attention to detail and perhaps a little addition in weight, the lecturer could see no reason why the engines of the immediate future should not run for 500 hours without overhaul, and be free from at least half the defects stated above.

On the British maintenance of aircraft, Sir Sefton made the statement that the standard type of aircraft, a biplane constructed of wood and fabric with interplane struts and wires, probably needs more attention than almost any other type. Such machines had, he said, flown for eighteen months, equivalent to 2000 hours in the air, without overhaul. He believed, however, that an all-metal, thick-wing monoplane without wires or struts would require much less attention and that it would fly for much longer periods without overhauling.



Assembly of four-speed Cotal planetary transmission for Voisin car

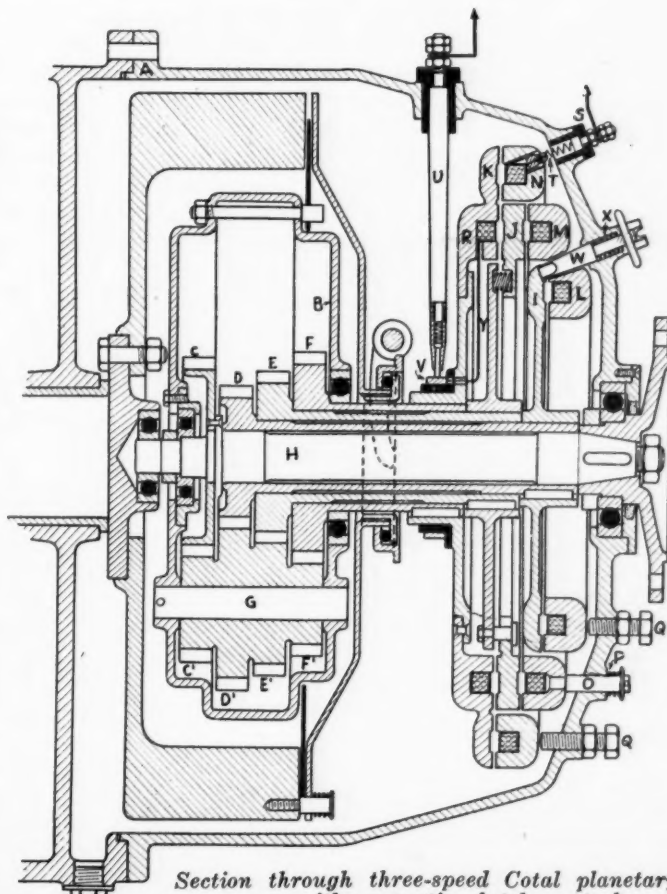
New French Planetary Gear Controlled by Magnetic Clutches

*Transmission invented by M. Cotal is of the all-spur type.
Silent in operation and eliminates physical effort
for gear shifting. Trials made by Voisin.*

A PLANETARY gear invented by M. Cotal is at present being experimented with by several French automobile manufacturers, as well as by the Paris General Omnibus Co. The transmission is of the all-spur type like that used on the Ford car, but it differs from other gears of this type in being controlled by magnetic clutches. It is claimed for this transmission that it is silent in operation, eliminates the physical effort required for gear shifting, and, when used in the four-speed form, permits of the use of a smaller engine.

In the accompanying photographs a four-speed Cotal transmission as applied to a Voisin car is shown, while the drawing shows a three-speed transmission. In other respects the two are alike. The Cotal transmission takes the place of the normal sliding gear set, the bell housing A being bolted up to the rear face of the crankcase. Surrounded by the flywheel is the casing B containing the sun gears C, D, E and F, engaging with the three sets of planetaries. Example: C', D', E' and F', forming one piece and mounted on shaft G.

Gear C is keyed to shaft H, but the gears D, E and F each have sleeves of decreasing length mounted concentric alloy on shaft H. The mild steel disk I is keyed to the sleeve forming a part of gear D. Plate J is keyed to E, and K to F. Opposite the plates I, J, K are the circular magnets L, M and N, which are held concentrically in the housing O on the studs P. These circular magnets have a slight longitudinal movement controlled by the springs Q and the adjusting screws R, but they cannot revolve. The plate J also forms the armature of the rotating electro-magnet S. By means of an electric switch on or under the steering wheel, electric current can be sent through the terminal T and the



Section through three-speed Cotal planetary gear with magnetic clutch control

flexible connection *U* to the desired magnet for the gear to be brought into engagement. Thus, to magnetize *S*, current is sent through *V* and the collector ring *W*, and reaches the coil by the radiating conductor *X*.

The operation of this mechanism is as follows: For first speed current is sent into *M*, thus bringing it in contact with *J* and holding gear *E* mounted on shaft *H*. The transmission shaft thereby turns in a forward direction at reduced speed in relation to the engine shaft. For second speed current is sent to *L*, thus locking it to *I* and holding gear *D*. This gives a higher speed ahead than the first combination, but a reduced speed in relation to the engine. For third speed the plate *S* is excited, thus coupling it with *J* and locking together the two gears *E* and *F*, and stopping all relative motion between the gears. The entire mechanism turning together at engine speed, direct drive is obtained. To obtain reverse, current is sent into *N*, thus locking the plate *K* and holding gear *F*, causing shaft *H* to turn in a reverse direction and at reduced speed in relation to the engine.

Emergency Device

The possibility of the electric current failing altogether is provided for in an emergency device for locking plate *I* and the gear *D*, thus bringing the second gear into engagement. A stud *Y* is mounted in the housing *O* and the plate *L*, but is normally kept out of engagement by a fork, with the additional safety of a cotter pin. By taking out the cotter and allowing the spring *Z* to push on the pin, this latter can drop into a slot in plate *I*, thus locking this to *L*.

It is stated that from 8 to 25 watts is consumed, according to the gear in engagement and the power developed. On all the cars used up to the present the normal 12-volt lighting and starting battery has been made use of. As the drawing indicates, a single plate clutch is provided, but it is possible to dispense with it, and when the car is in motion the clutch pedal need not be touched either for changing up or down.

Among the trials made by the Voisin Company was a high speed run from Paris to Nice, a distance of 520 miles, which was accomplished in 14 hours. A stock car with a four-cylinder Knight engine of only 94 cu. in. displacement was used, and the high average was attained by making full use of the gears. The Cotal transmission is being exploited by the Societe d'Exploitation des Brevets Cotal, 31, Place St. Ferdinand, Paris.

The Fiat Two-Stroke Racing Engine

FOR several months it has been known that the Fiat Company was working on a 91½ cu. in. two-stroke cycle engine for this year's European races, and there has been much speculation regarding the detail design. The first definite information regarding this interesting engine comes to us in the latest issue to hand of *Dimanche-Auto*, a French periodical. A diagrammatic sectional view of the engine from the publication mentioned is reproduced herewith.

As will be seen from the drawing, the engine comprises six vertical cylinders arranged in line, each containing two pistons. The double piston type of engine is well-known and has been used in automobile practice by various makers, but usually the two sets of pistons work on a single crankshaft, one set through long con-

necting rods, of which there are two to each piston. For the Fiat engine, because of the high speed contemplated, this arrangement was considered impracticable on account of the great weight of the reciprocating parts, and two crankshafts were therefore provided, which are connected by gearing at the rear end. The gears on the crankshafts apparently serve as the flywheels, and with a six-cylinder two-stroke engine this is no doubt quite practical, as there is wide over-lapping of power strokes and the torque is very nearly uniform.

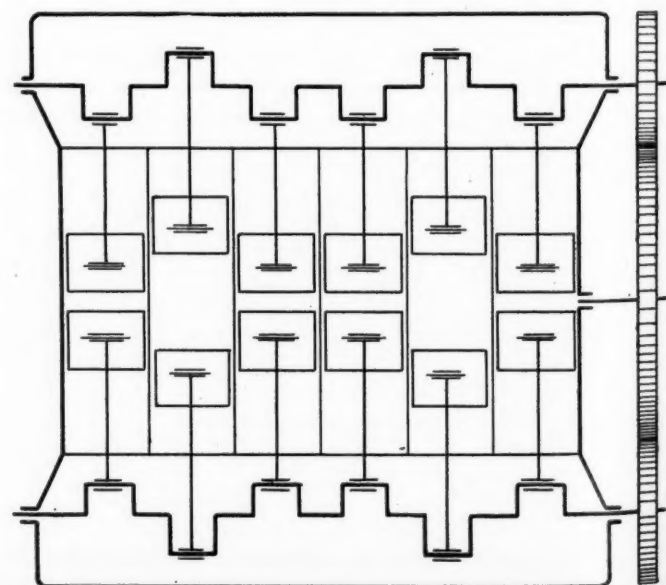
The gear wheels on the two crankshafts mesh with a single central gear wheel on the transmission or clutch shaft. The spark plugs, of which two are used per cylinder, are arranged horizontally along the transverse axis of the engine.

The engine is said to have developed an exceedingly high specific output, greater than that of the 122 cu. in. supercharged engines of the last few years, which it almost equals in respect to absolute power, and this result was obtained without resorting to the fantastic angular speeds which the four-stroke type of engine is approaching. The new two-stroke does not exceed 5000 r. p. m., and the hope is expressed that this comparatively low speed will give a very robust and durable engine, capable of standing up in long distance contests.

The racing engine is provided with a centrifugal type supercharger and exhaust through ports in the cylinder wall at the end of the stroke. While it is not so stated, the uniflow principle is undoubtedly made use of, by which the inlet ports are placed at one end of the cylinder barrel and the exhaust ports at the other, this permitting of extending each set of ports practically all the way around the cylinder, thus obtaining large port capacity without exceedingly high ports.

It is stated in our source that developments are under way looking toward the application of an engine of this type to a sport type of car, using a Roots type of blower instead of the centrifugal supercharger, running at lower speed and making some other detail changes.

The problem of the two-stroke engine, however, is not the only one on which the engineering staff of Fiat is working. For some months the plan of a stock touring car with front wheel drive has been under consideration. In other words, the possibilities of front wheel drive for various types of stock car are being studied.



Diagrammatic sectional view of Fiat two-stroke racing engine

Just Among Ourselves

Growing Use of Ball Bearings in Racing Cars

ONE of the things which seems to have been brought about, indirectly, at least, by the struggle to offset the restriction of piston displacement in racing cars is the increased use of anti-friction bearings. At any rate, the number of such bearings built into the competing cars at Indianapolis was greater this year than ever before. The foreigners, who have always had a penchant for sticking balls or rollers into the main power lines of their racing engines, by being present in greater numbers than usual were, of course, partly responsible for the increased total but not entirely so. Superchargers helped also and even steering gears contributed. The winning Miller had 62 ball bearings tucked away here and there in its vitals, ten of them in the supercharger. With engine speeds approaching 7000 r.p.m., being a supercharger main spindle bearing must be a dizzy business, somewhat, we might add, like trying to keep up with price changes in certain quarters. Incidentally, the development of a ball bearing that can be operated at speeds of 25,000 to 35,000 r.p.m. may be rated as a real achievement.

* * *

Automobiles Flayed by Music Manufacturers

WE see by the papers that some music manufacturers have been sounding a few discords in the automotive symphony. "The automobile has upset American life," wails A. G. Gulbranson, piano manufacturer of Chicago. "We have left our homes and taken to the highways and old-fashioned American home life is something for the historians to write about." At the same meeting of the National Music Industries,

W. O. Miessner of Milwaukee sang the following dirge: "We go gallivanting about the country in automobiles, parents in one direction—too often in opposite directions—sons and daughters in divers directions. The automobile, with all its contribution to transportation, is a centrifugal force that is dispersing the family. Where is the American home? It's a Ford."

* * *

Home Life Improved by Motor Vehicle

WE heartily agree with the statements of the two eminent harmony dispensers, only we would proclaim these facts as achievements to the credit of the motor vehicle rather than as criticisms of it. For millions of American people the highways offer more light, air, health and happiness than do their homes, while a home in a Ford may easily be quieter and more productive of peaceful contemplation than the one room home housing a family of five or six. And we've seen more than one family, the members of which are both happier as individuals and more useful as citizens in dispersed form than when assembled as a unit. The automobile has done much to take the boredom out of the American home, to make it possible for its members to see more new things, to associate with more new people and thus to appreciate and enjoy far more the other members of their own family when they are together than would have been possible under the old-fashioned system of forcible association twenty-four hours a day. The American home is not and cannot be a static institution any more than the other phases of our civilization; it must change and develop if its highest possibilities are to be realized.

Music Also Hath Power to Wreck Homes

AND furthermore, we don't think half as many homes are ruined today by the automobile as were ruined by badly played musical instruments in the old days when it was impossible to escape the punishment by dashing away in the car. Many a man has gone crazy listening to little Willie practicing his piano lesson in the next flat. The cornet fiend was a stock vaudeville joke for years and a wailing violin has involved many a neighborhood in fist fights and slander suits.

* * *

American Competition as a Strike Breaker

A STRIKE broke out in the body shops of the Renault automobile works in the suburbs of Paris during the latter part of May. It spread to other departments and interfered so much with production that the management felt compelled to shut down the plant, whereby some 30,000 people were thrown out of employment. A letter was sent by the management to each employee in which the situation of the French automobile industry was outlined: "You are familiar with the fact," the letter said, "that the number of American cars running in France is increasing every day. These vehicles enter our country in spite of import duties, transport cost, etc., at extremely low prices. Nevertheless the workman who fabricates them receives a high wage and has normal working hours, hence the efficiency of labor is higher. We cannot believe that with good collaboration and with reciprocal good will we cannot obtain results identical with those obtained abroad." It is said that the result of this letter was request for reinstatement from 20,000 strikers and the works were reopened.—N. G. S.

Supercharging Increases Power Output, Lowers Fuel Efficiency

When used to compensate for loss of volumetric efficiency due to high speed of engine or high altitude, a substantial increase in output is gained for slight power absorption.

By C. B. Dicksee

SUPERCHARGING an internal combustion engine means the process of introducing into the working cylinder a weight of fresh mixture greater than that which would be introduced under normal circumstances. This article does not deal with the mechanical means of producing the desired supercharge; its purpose is to show the limitations of the system and a method of analyzing the effects produced.

The analysis shows that where the maximum compression is limited by the detonating characteristics of the fuel, no very great increase in net output can be obtained under operating conditions which are such as to allow of a normal weight of charge being drawn into the cylinder, but when resorted to to compensate for a loss of volumetric efficiency due to high speed or high altitude a very substantial increase in output can be obtained for a slight expenditure of power.

Fig. 1 shows diagrammatically an engine and supercharger. The power cylinder *W* is shown with its piston at the commencement of the induction stroke. The supercharger *S* is illustrated as a piston pump having a swept volume greater than that of the working cylinder and is shown in a position ready to deliver a charge to the working cylinder *W*. The pressure throughout the system is that of the surrounding atmosphere, P_a . The supercharger may be arranged to discharge into some

form of receiver and maintain therein a more or less constant pressure, but whatever arrangement is adopted, the system is fundamentally the same as that shown in the figure. A piston type of compressor has been shown as it gives a far clearer conception of the operation than does any form of rotary compressor.

The initial volume of the whole system, V_1 , is the sum of V_s , the swept volume of the supercharger, V_c , the volume of the combustion space, and the necessary clearance in the connecting passages, etc.

As the piston of the working cylinder moves outward, that of the supercharger moves inward and transfers its charge to the working cylinder. At the end of their respective strokes the positions of the two pistons are as shown in Fig. 2. The volume in this position, V_2 , will be the sum of V_w , the swept volume of the working piston, V_c , the volume of the combustion space, and the clearance in the passages, etc.

It may be well here to mention that the clearance volume will have no effect upon the thermodynamics of the engine if it is assumed that the intake valve of the supercharger is not opened on the return stroke until the pressure within it has fallen to that of the outside air. The work of compressing the gas which remains in the clearance and passages will then be returned and may therefore be neglected and only that work taken into account which is done on the gas actually passing into the working cylinder. The only effect of clearance will then be to increase the size of the supercharger by a volume proportional to that of the clearance volume and the supercharge compression ratio.

As the supercharger has a greater swept volume than that of the working cylinder, V_1 will be greater than V_2 and the pressure P_s after induction will be greater than P_a . By the ordinary compression pressure equation we get:

$$P_s = P_a (V_1/V_2)^\gamma = P_a (R_s)^\gamma$$

where R_s = the supercharge compression ratio. A moment's reflection will show that for the same initial pressure P_a , R_s also equals the ratio between the weight of charge which has been introduced into the working cylinder and that which would have drawn into the same cylinder had supercharging not been resorted to.

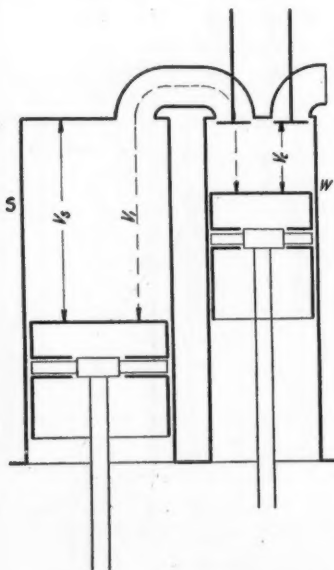


FIG. 1

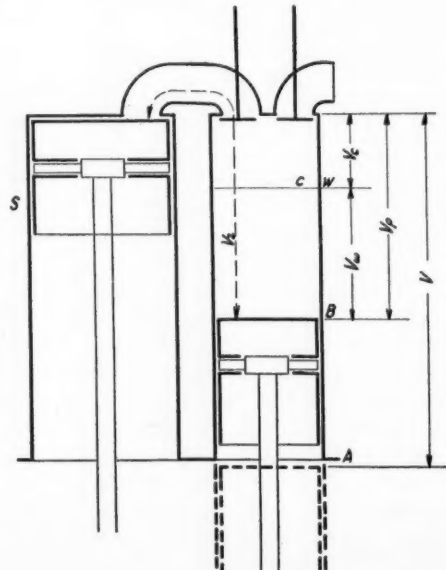


FIG. 2

The intake valve of the working cylinder now closes and compression takes place on the return stroke as in the ordinary Otto engine, with the important exception that the starting point of compression will be P_s instead of P_a , and the final compression pressure will be greater than that which would result from the same initial and final volumes in an ordinary engine. From the usual equation the compression pressure will be:

$$P_c = P_s (V_c/V_p)^\gamma = P_s (R_w)^\gamma$$

where V_p = the total volume of the working cylinder and R_w = the compression ratio of the working cylinder. Substituting for P_s from the previous equation,

$$P_c = P_a (R_s)^\gamma \times (R_w)^\gamma = P_a (R_s \times R_w)^\gamma = P_a (R_c)^\gamma$$

where R_c = the total compression ratio to which the gas has been submitted.

The final result, insofar as the compression is concerned, is as if the piston of the working cylinder had started to compress the mixture at atmospheric pressure from a point farther down the cylinder, as shown in Fig. 2 where B is the actual starting point of the piston and A the position from which it would have had to start to produce the same ultimate compression as has been produced with the supercharger. If now V represents the total volume corresponding to the point A , and V_p equals the true total volume of the working cylinder, $V - V_p$ will equal the amount of additional charge which has been added by the supercharger and V/V_p will be the supercharge ratio R_s .

Since the piston of the working cylinder works only between V_c and V_p , the expansion ratio R_e will be V_p/V_c , that is, the same as the compression ratio within the working cylinder. We therefore have an engine which has a true compression ratio greater than that of the expansion ratio.

Efficiency and Compression Ratio

The efficiency of an engine is frequently spoken of as being dependent upon the compression ratio. This, however, is not the case, as it is the expansion ratio upon which the efficiency depends. As ordinarily built, the compression ratio and expansion ratio are equal, so that the error is of small consequence, but with a supercharging engine wholly misleading results will be produced if this point is not fully understood.

With a supercharging engine, as with all other engines into which the fuel and air are introduced simultaneously, a limit to the compression ratio which can be used is imposed by the detonating characteristics of the fuel. The maximum compression pressure which a fuel will stand without giving trouble will be substantially the same whether the engine is supercharged or not. We are therefore faced with the fact that for a given fuel, we have a maximum total compression ratio which can be used for either a supercharged or an ordinary engine. As already pointed out, the compression ratio of a supercharged engine is greater than the expansion ratio. For a given total compression ratio therefore the expansion ratio must decrease as the degree of supercharge increases. It follows then that, as the efficiency will depend upon the expansion ratio, for the same total compression ratio the efficiency of a supercharged engine must always be less than that of one which is not supercharged and will decrease as the degree of supercharge is increased.

This statement will be readily understood if the conditions existing are examined by the air standard. According to this, the efficiency of an engine operating upon

the constant volume cycle will be given by

$$E = 1 - (1/R)^\gamma$$

where R = the expansion ratio and γ = the ratio of the specific heats = 1.4.

As already pointed out, the total ratio $R_c = R_s \times R_w$ and the efficiency will be solely dependent upon R_w . The value of R_w must therefore be used in the equation for the air standard efficiency. The weight of the charge fed to the engine is proportional to R_s . Hence the output from the engine will be proportional to

$$W = R_s \times E$$

In Table 1 are shown the results obtained by taking $R_c = 6$ and R_s with different values ranging from 1 to 6.

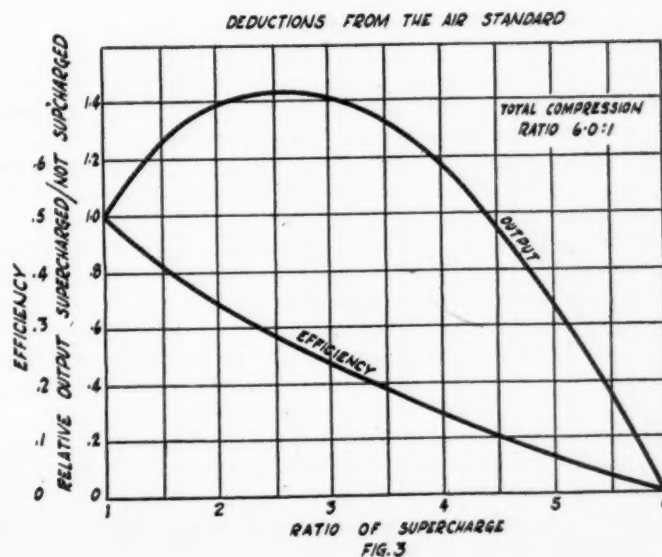
TABLE I

R_s	1.0	1.2	1.5	2.0	3.0	4.0	6.0
R_w	6.0	5.0	4.0	3.0	2.0	1.5	1.0
Eff.	.512	.475	.426	.355	.241	.150	.000
Work	.512	.570	.640	.710	.724	.600	.000
Ratio of Work	1.00	1.11	1.25	1.38	1.41	1.17	0.00

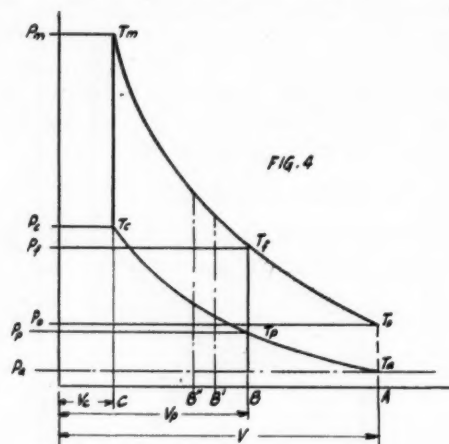
In Fig. 3 are shown the output relative to that of the non-supercharged engine and the efficiency plotted against the supercharge ratio. This shows that at first there is a steady increase in output up to a maximum of about 44 per cent with a supercharge ratio of 2.5. After passing this point the output falls until zero is reached with a supercharge ratio of 6, i. e., when $R_s = R_c$ and R_e is unity. This means that there is no expansion and therefore no power is developed.

These figures, however, tell only part of the story. To compress the charge in the supercharger, work is required, and this work must be obtained from the power cylinder. The work of compression in the ordinary engine is returned during the power stroke, and no loss is occasioned, but that done in the supercharger is loss, since no expansion takes place in the supercharger and the expansion is not carried down to the original volume. This work reaches a very considerable magnitude when a high supercharge ratio is used and will very materially reduce the net output which is delivered by the engine.

The complete cycle of operations will be more clearly



understood by studying the resulting pressure-volume diagram. Such a diagram (on which the notation corresponds to the foregoing remarks) is shown in Fig. 4. A volume of gas V at atmospheric pressure P_a and temperature T_a is first drawn into the supercharger and compressed by it into the working cylinder. The volume un-



der these conditions is reduced to V_p . The compression ratio of the supercharger $R_s = V / V_p$, the pressure of supercharge will therefore be $P_p = P_a \times R_s$, and the temperature will be $T_p = T_a \times R_s$.

The compression is now continued in the power cylinder, starting with the initial pressure, until the volume has been reduced to V_c , at which point the pressure and temperature are P_c and T_c respectively.

That the result is exactly the same as if the whole compression had been carried out in the power cylinder and the whole reduced in one stage from V to V_c is clearly brought out in the P - V diagram, which shows a single compression curve for the two stages. We therefore have

$$P_c = (P_a \times R_s^\gamma) R_p^\gamma = P_a \times R_c^\gamma$$

$$T_c = (T_a \times R_s^{\gamma-1}) R_p^{\gamma-1} = T_a \times R_c^{\gamma-1}$$

Combustion now takes place at constant volume and the pressure and temperature are increased to P_m and T_m .

In the expansion which follows, the volume increases from V_c to V_p at which point the pressure and temperature are P_p and T_p .

As expansion takes place in the power cylinder only, V_p is the final volume and the pressure is released at this point as shown by the vertical line on the diagram.

Had the expansion been carried down to the original volume, as is the case of the ordinary engine, the expansion curve would have continued as shown dotted until the pressure and temperature would have been P_a and T_a the volume being V . This full expansion illustrates the diagram for the non-supercharged engine using the same volume of gas V .

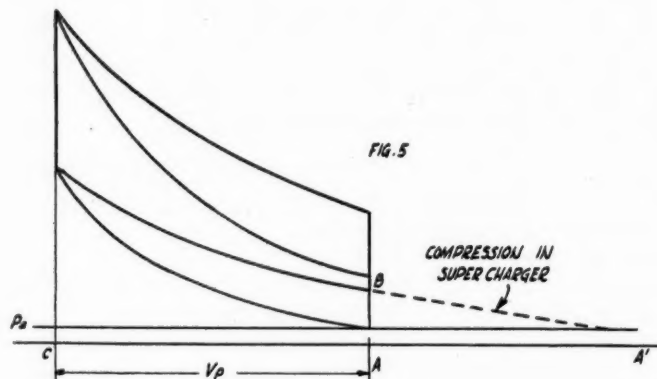
The temperature at any point of the cycle, when multiplied by the weight of gases present and their specific heat corresponding to the temperature, will give the energy contained in the gases at that point, and the difference in energy between any two points on either the compression or the expansion curve will give the work done on or by the gas between those two points.

Let H with the suitable suffix represent the heat present in the gas at the various cardinal points of the diagram in Fig. 3.

Then the total work done on the gas during compression will be given by $H_c - H_a = W_c$. This, however, is

done in two stages, the amount of work corresponding to each of these being $H_p - H_a = W_s$, the work done in the supercharger, and $H_c - H_p = W_p$, the work done during compression in the power cylinder. Hence $W_c = W_s + W_p$.

The work done by the gas during expansion will be $H_m - H_p = W_e$ and the resultant work for the whole cycle



will be $W_e - W_p = W$ or $(H_m - H_f) - (H_c - H_a)$.

Had the expansion been carried down to the original volume, an additional amount of work would have been done, corresponding to the area T_a, T_p, T_f, T_o ; this may conveniently be designated W_l , the lost work. This is rejected in the exhaust gases and is responsible for the difference in efficiency between a supercharged and a non-supercharged engine, as determined by the air standard.

The actual work done in the power cylinder will be $W_e - W_p$. From this must be derived the work required in the supercharger. The efficiency is therefore reduced by the work required to produce the necessary degree of supercharge, that is by $(H_p - H_a)$ or W_s .

For a given total compression ratio the diagrams for a supercharged and an ordinary engine are similar, with the exception that the expansion of the supercharged engine is not continued to the original volume. Fig. 4 is such a diagram and shows the P - V diagram for both a supercharged and an ordinary engine operating with the same volume of gas and the same total compression ratio, and very clearly shows how with the supercharged engine a smaller amount of work is done per unit weight of charge.

The stroke of the ordinary engine will correspond to AC in the figure, while that of the supercharged engine will correspond to BC . Comparing the two engines on the basis of similar cylinders, the diagrams must be reconstructed on a base where $AC = BC$. Such a diagram is shown in Fig. 5 and clearly illustrates how a greater amount of work can be done per cylinder in the case of the supercharged engine (the diagram in heavy lines) despite the decreased amount of work per unit weight of charge.

Fig. 5 has been lettered to correspond to Fig. 4, the point A' corresponding to the point A in Fig. 4 for the supercharged engine and represents the commencement of compression in the supercharger. The area $A'BA$ represents the work lost in the supercharger and which must be deducted from the work done in the power cylinder. Referring again to Fig. 4, it will be seen how, as the degree of supercharge is increased (as shown by the points B', B'' , etc.), the work lost due to incomplete expansion (W_l) will increase also. At the same time the work absorbed in the supercharger increases rapidly, with the result that the output obtainable at any degree of supercharge will be less than was indicated by the comparison made by the air standard, and the maximum increase will be reached at a lower supercharge ratio.

TABLE II

Assumed and Calculated Data of Six Examples in Which the Total Compression Ratio is the Same but the Degree of Supercharge Varies

Compression Ratio— R_c	6.0	6.0	6.0	6.0	6.0	6.0
Expansion Ratio— R_e	6.0	5.0	4.0	3.0	2.5	2.0
Swept Volume— V_s	cu. ft. 15.3	15.3	15.3	15.3	15.3	15.3
Compression Volume— V_c	cu. ft. 3.06	3.82	5.10	7.65	10.20	15.30
Weight of Residual Gases— M_r	lbs. 0.07	0.087	0.117	0.175	0.233	0.35
Ratio of Supercharge— R_s	1.00	1.20	1.50	2.00	2.40	3.00
Weight of Fresh Gas— M_f	lb. 1.00	1.20	1.50	2.00	2.40	3.00
Total Weight of Charge— M	lb. 1.07	1.287	1.617	2.175	2.633	3.35
Initial Temperature of Charge— T_a	°K 393	394	398	403	408	418
Heat in charge at Initial Temp.— H_a	C. T. U. 75	91	115	157	192	251
Pressure of Supercharge— P_p	lb./sq. in A 14.7	18.6	24.9	36.2	45.9	61.4
Temperature of Supercharge— T_p	°K 393	416	450	490	530	581
Heat in charge at Temp. of Supercharge— H_p	C. T. U. 75	96	131	196	255	358
Work done in Supercharger— W_s	C. T. U. 0.0	5.0	16	39	63	107
Pressure at end of Compression— P_c	lb./sq. in A 151	151	151	151	151	151
Temperature at end of Compression— T_c	°K 674	676	682	691	698	716
Heat in charge at end of Compression— H_c	C. T. U. 136	162	208	281	345	450
Heat Released by Combustion— H	C. T. U. 625	750	937	1250	1500	1875
Heat Released by Combustion less 15% loss— H_r	C. T. U. 530	636	795	1060	1272	1590
Total Heat in charge after Combustion— H_m	C. T. U. 666	798	1003	1341	1617	2040
Temperature after Combustion— T_m	°K 2675	2664	2670	2655	2643	2630
Pressure after Combustion— P_m	lb./sq. in A 599	596	590	580	573	554
Pressure after Expansion— P_f	lb./sq. in A 64	80	104	147	182	234
Temperature after Expansion— T_f	°K 1710	1780	1880	2016	2102	2210
Heat Remaining in Charge after Expansion— H_f	C. T. U. 390	492	658	963	1226	1656
Work done in power cylinder (Gross output)— W_p	C. T. U. 216	240	268	292	301	292
Gross output less Work in Supercharger (Net output)— W_n	C. T. U. 216	235	252	254	238	185
Gross Work/Work Non-Supercharged Engine	1.0	1.11	1.24	1.35	1.39	1.35
Net Work/Work of Non-Supercharged Engine— H_r	1.0	1.09	1.17	1.175	1.10	.85
Efficiency on Gross Output— E_p	% 34.6	32.0	28.6	23.4	20.0	15.6
Efficiency on Net Output— E_n	% 34.6	31.4	26.9	19.5	15.8	9.0
Work in Supercharger/Work in Power Cylinder— e	% 0.0	2.2	6.0	13.4	21.0	36.6

The final results are best illustrated by working out an example, making the necessary allowances for the usual losses found in actual operation. The results of such an analysis are given in Table 2. The method of doing this is given in the latter part of this article and calls for only a moderate understanding of thermodynamics.

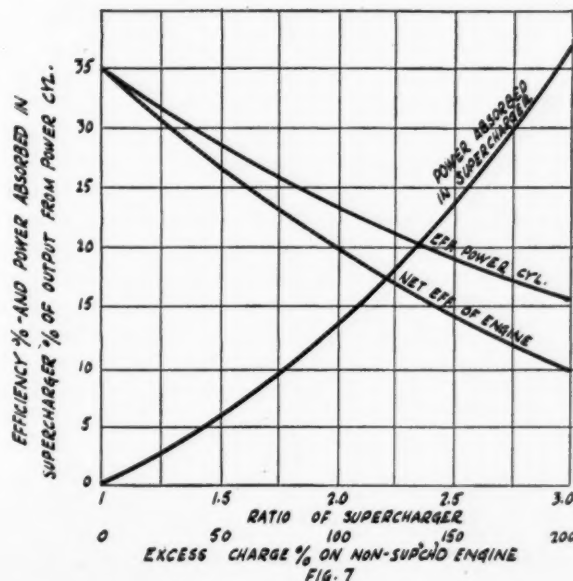
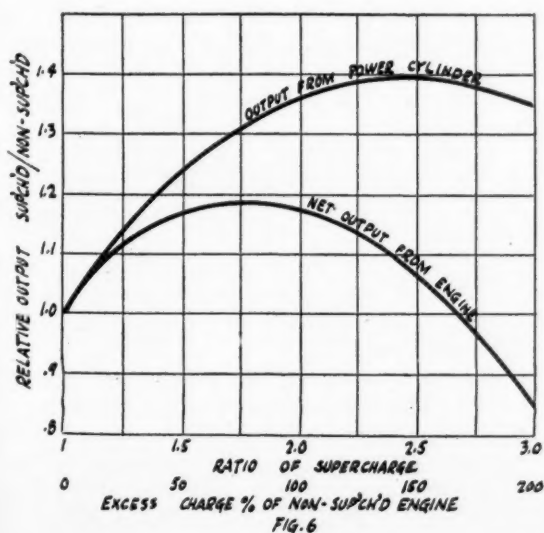
The most interesting results are shown in Figs. 6 and 7 plotted against a base of ratio of supercharge, this being the factor of chief interest.

An examination of these curves reveals that the ratio between the output from the power cylinder of the supercharged and the non-supercharged engine with the same total compression ratio is substantially the same as that derived by means of the air standard as shown in Table 1. This is to be expected, since nearly all good engines show

an indicated efficiency of about 60 per cent of the air standard efficiency.

The power absorbed by the supercharger, though small at first, reaches a very considerable proportion of that developed in the power cylinder at a high degree of supercharge. At the point of maximum output from the power cylinder, the supercharger will absorb some 20 per cent of the developed output. The actual amount of power absorbed by the supercharger will vary to some extent with the assumed absolute temperature of the gas at entry to the supercharger, but the difference will not be very great for any temperature likely to be found in practice.

The net result is that a maximum increase in output of about 20 per cent is obtainable, the corresponding super-



charge ratio being 1.75. The efficiency under these conditions is reduced to about 23 per cent instead of 35 per cent as given by the ordinary engine.

It must be remembered that the figures quoted are indicated values and that the brake values will therefore be less. Brake values have not been considered, on account of the difficulty of determining the loss by friction in the supercharger. The mechanical efficiency of an ordinary engine of good design is about 85 per cent and with a supercharger added it will not be much over 80 per cent, if as high. The maximum output, when compared to that of the ordinary engine, will therefore be of the order of

$$1.20 \times .80/.85 = 1.13 \text{ (approx.)}$$

a figure which will be reduced if the supercharger is of poor design.

The results as to temperature and pressure are interesting. The change in the maximum values of these are negligible over the profitable range of supercharge, and such change as there is is in the downward direction. The temperature at the end of expansion naturally increases considerably as the expansion ratio decreases, and it is from this feature and the greatly increased quantity of heat which the cooling system must handle that the greatest difficulties are likely to be experienced. High release temperatures mean high exhaust valve temperatures, with the attendant difficulties. While the maximum pressure is not higher the mean pressures are, and the average bearing loading will be correspondingly increased and will therefore have to be taken into account.

No Great Increase in Power

Taken all round, it would appear that no very startling increase in power can be obtained by supercharging an engine which operates under conditions which allow of anything like a normal charge to be drawn into the cylinder. The proposal to eliminate gear changing by utilizing a supercharging engine therefore gives no promise of success.

If, however, supercharging is applied to restore the loss of volumetric efficiency, due to high speed or high altitude, the case is very different. Other things being equal, the indicated power of an engine is proportional to the weight of fresh mixture admitted per stroke. If, therefore, due to friction and inertia, the weight of charge is reduced to

atmospheric pressure to about 10 lb. and means that it takes a pressure of approximately 5 lb. to drive the charge through the manifold system. A supercharge giving 5 lb. pressure above atmosphere at the mouth of the intake will therefore enable a full charge to be fed to the cylinder and will result in an increase of from 2/3 power to 3/3 power or an increase of 50 per cent for a very low degree of supercharge. To produce 5 lb. excess pressure at the intake will call for a supercharge ratio of a little under 1.25 and will absorb only about 5.5 per cent of the output from the power cylinder. A loss equivalent to 2/3 atmosphere can be made up with an expenditure of only about 7.5 per cent of the gross output.

Correcting Drooping Power Curve

It will therefore be seen that when employed as a means of correcting a drooping power curve the supercharge can be expected to produce great results, but as a means of increasing the output under conditions which permit of a good cylinder charge being obtained, no very great results can be expected.

The case of supercharging to correct for altitude is very similar to that of correcting for loss of volumetric efficiency due to high speed. The main difference lies in the fact that due to the reduced density of the atmosphere the initial volume of the gas is much greater and the change in volume in the supercharger is greater for a given weight of gas and supercharge ratio. This means that the work done in producing a corresponding increase in intake pressure will be somewhat greater. The difference, however, will not be very great, and the results are in much the same proportion as when correcting for loss of volumetric efficiency.

An indirect increase in power results from the elimination of distribution troubles. A uniform mixture is delivered to all cylinders so that the best ignition and carburetor setting can be used instead of a compromise which is really incorrect for all the cylinders and therefore results in a loss in power.

In practically all thermodynamic calculations it is found convenient to deal with unit weight of gas. In arriving at the results given in Table 2, it has been assumed that the non-supercharged engine is supplied with one pound of a mixture in the proportion of 15 lb. air/lb. fuel and that this mixture is chemically correct and liberates 625 C. T. U./lb. upon combustion. (1 C. T. U., Cent. thermal unit, = heat to raise 1 lb. water 1 deg. C. = 1.8 B. T. U.) The pressure at the end of the suction stroke is taken as atmospheric and the temperature before mixing with the residual exhaust gases is taken as 350 deg. K. (Temperatures on the absolute Centigrade scale are now generally written deg. K.—Kelvin). Under the above conditions 1 lb. of air will occupy 16.02 cu. ft. and 1 lb. gasoline vapor 4.58 cu. ft. The volume of 1 lb. of mixture will therefore be:

$$(16.02 \times 15 + 4.58)/16 = 15.3 \text{ cu. ft.}$$

The swept volume of the working cylinder will therefore be 15.3 cu. ft. in all cases in order that a direct comparison may be obtained.

The value of γ for the compression stroke has been taken as 1.30 and that of the expansion stroke as 1.25, as these appear to approximate to the values actually existing in high speed engines.

The total heat content of the gases at any temperature T deg. K. has been taken as being given by the equation: $H = 0.167T + 0.000031T^2 - 0.2417 \times 10^{-5} T^3$ where H = heat content per lb. in Centigrade thermal units. This equation is taken from a paper published by R. W. Bailey in *Engineering*, October 2, 1925, and is deduced from

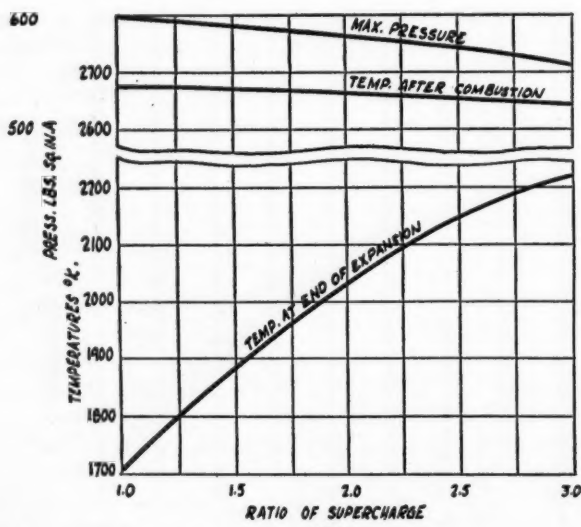


FIG. 8

2/3 of that obtained at low speeds, the indicated power will be reduced to 2/3 of that possible with a constant volumetric efficiency.

The foregoing case corresponds to a reduction of

results given by Dr. T. B. Morley. The various values quoted in Table 2 were obtained by means of a table published in Mr. Bailey's article.

It has been assumed that 15 per cent of the heat liberated by combustion is lost by direct cooling during combustion. This value would appear to conform very closely to actual practice, as is shown by the work of Dugald Clerk, Ricardo, and others, and has been introduced into this analysis in order that the results may conform as nearly as possible to the actual conditions of operation.

The maximum compression ratio which the fuel will stand has been taken as 6.0:1.

Failing any definite values, the temperature of the residual exhaust gases has been taken as 1000 deg. K. in all cases. This is not quite correct, but the error will be small.

The various minor losses which round off the corners of the indicator diagram have not been allowed for as they are small and should not change the relative values.

The results are left as indicated values because, as pointed out in the text, of the uncertainty of the mechanical losses in the supercharger.

The symbols employed below are made to conform with the body of the article in order that the line of reasoning may be more easily followed. To make this still more clear, the case of a supercharged engine with a supercharge ratio of 1.5 is worked out in full.

- T_1 = Temperature of the fuel gas on entering the cylinder = 350 deg. K.
 P_a = Pressure at the commencement of compression = 14.7 lb./sq. in. A
 V_w = Volume of 1 lb. of fresh gas at P_a and T_1 = swept volume of working cylinder = 15.3 cu. ft.
 R_c = The total compression ratio = 6.0:1
 R_w = R_c = compression and expansion ratio in the working cylinder = 4.0:1
 R_s = Supercharge ratio = $R_c/R_a = 1.5$ = weight of fresh gas supplied to the engine = M_f .
 V_c = The volume of the combustion chamber = $V_w/(R_w - 1) = 15.3/3 = 5.1$ cu. ft.
 T_z = The temperature of the residual exhaust gases = 1000 deg. K.
 M_z = Weight of residual exhaust gases = $(V_c/V_w) \times (T_1/T_z) = (5.1/15.3) \times (350/1000) = 0.117$ lb.
 M = Total weight of charge = $M_f + M_z = 1.617$ lb.
 T_a = Temperature of the charge after mixture = $(T_a \times M_f + T_z \times M_z)/M = (350 \times 1.5 + 1000 \times 0.117)/1.617 = 398$ deg. K. (neglecting the small difference in specific heats).
 H_a = Heat in charge at $T_a = 115$ C. T. U.
 P_p = Pressure of supercharge = $P_a \times R_s^{1.3} = 14.7 \times 1.5^{1.3} = 24.9$ lb./sq. in. A
 T_p = Temperature of supercharge = $T_a \times R_s^{0.3} = 398 \times 1.5^{0.3} = 450$ deg. K.
 H_p = Heat in charge at $T_p = 131$ C. T. U.
 W_s = Work done on gases in supercharge = $H_p - H_a = 131 - 115 = 16$ C. T. U.
 P_c = Pressure at the end of compression = $P_a \times R_c^{1.3} = 14.7 \times 6.0^{1.3} = 151$ lbs./sq. in. A
 T_c = Temperature at the end of compression = $T_a \times R_c^{0.3} = 398 \times 6.0^{0.3} = 682$ deg. K.
 H_c = Heat in charge at the end of compression = 208 C. T. U.
 W_c = Work done during total compression = $H_c - H_a = 208 - 115 = 93$ C. T. U.
 W_w = Work done during compression in working cylinder = $H_c - H_p = 208 - 131 = 77$ C. T. U.
 H = Heat liberated during combustion = $625 \times 1.5 = 937.5$

- H_r = Heat remaining after combustion = $625 \times .85 \times 1.5 = 795$
 H_m = Total heat in charge after combustion = $H_r + H_c = 795 + 208 = 1003$ C. T. U.
 T_m = Maximum temperature after combustion = 2671 deg. K.
 P_m = Maximum pressure after combustion = $P_c \times T_m/T = 151 \times 2671/682 = 590$ lb./sq. in. A
 P_f = Pressure after expansion = $P_m/R_e^{1.25} = 590/4.0^{1.25} = 102.5$ lb./sq. in. A
 T_f = Temperature after expansion = $T_m/R_e^{0.25} = 2671/4.0^{0.25} = 1880$ deg. K.
 H_f = Heat rejected in charge at $T_f = 658$ C. T. U.
 W_e = Work done during expansion = $H_m - H_f = 1003 - 658 = 345$ C. T. U.
 W_p = Work done in power cylinder = $W_e - W_w = 345 - 77 = 268$ C. T. U.
 E_p = Efficiency of power cylinder = $W_p/H = 268/937.5 = 28.6$ per cent.
 W_n = Net output from engine = $W_p - W_s = 268 - 16 = 252$ C. T. U.
 E_n = Net efficiency = $W_n/H = 252/937.5 = 26.9$ per cent.
 ϵ = Fraction of W_p absorbed in supercharge = $W_s/W_p = 16/268 = 5.96$ per cent.
 W = W_p for non-supercharged engine = 216 C. T. U.
 W_r = Output of supercharged engine relative to non-supercharged engine = $W_n/W = 252/216 = 1.165$.

The above calculation, though perhaps somewhat lengthy, is not at all difficult and a comparison can be very readily made for any particular set of conditions which may be desired.

Brush Applied Duco Lacquer

A PYROXYLIN lacquer similar to the spray gun applied Duco, except that it contains an agent that permits its application by hand brush, has recently been placed on the market by the E. I. du Pont de Nemours & Co., of Wilmington, Del. The new brush applied Duco can be used over the old finish of automobiles except where the latter is badly checked. Where the old finish is in bad shape the recommendations call for its removal and application of a special primer over which the Duco is brushed, allowing from 45 to 60 minutes between coats. When refinishing automobile bodies it is advised that the panels be sectioned, the wet edge holding for five minutes to allow full coverage of the whole surface. An ordinary soft paint brush is used for applying the Duco which dries without showing brush marks.

THE suggestion was made recently by Colin Macbeth, a British tire engineer, that a line similar to the Plimsoll line used on ships might be molded into tires to afford an easy and quick method of roughly checking their pressure. Such a method could give only approximate results at the best since balloon tire pressures recommended by tire manufacturers vary as much as 10 lb. for the same size under different load conditions. It is a question as to what variation in pressures under constant load would result in tire deflections of sufficient magnitude to be measured on the road and with varying loads being carried by tires of the same size the difficulty of checking inflation pressures by such measurements would be increased.

It appears to be possible, however, that such a plan might be used for determining if pressures are approximately correct or if they should be further checked by a pressure gage.

New 91½ In. Talbot Racer Designed for European Tracks

French firm develops new models for coming Grand Prix Races.
Girder frame used. Front axle made in halves and bolted together at middle. Roots blower.

By W. F. Bradley

OFFICIALLY, 1926 marks the adoption of the 91½ cu. in. piston displacement rule in Europe, but minor races for this type of car have been held for the last three years and some European manufacturers already have a lengthy experience of racing cars with an engine of this size.

The French Talbot Co., one of the three organizations composing the Franco-British S.T.D. Syndicate, has raced with 91½ in. cars for three years and has the unique record of having won every race in which its cars have been entered. This year new models have been produced with a view to competing in the French Grand Prix, the European Grand Prix, the Brooklands race and the Italian Grand Prix at Monza.

Designed by Engineer Bertarioni, an Italian who received his training with the Fiat Co., the Talbots are distinctive in having a special type of girder frame with front and rear axles passing through it; engine and

transmission offset in the frame, allowing the driver to be seated by the side of the drive shaft; a total height of only 32 in. with 28 in. wheels, and a straight-eight supercharged engine.

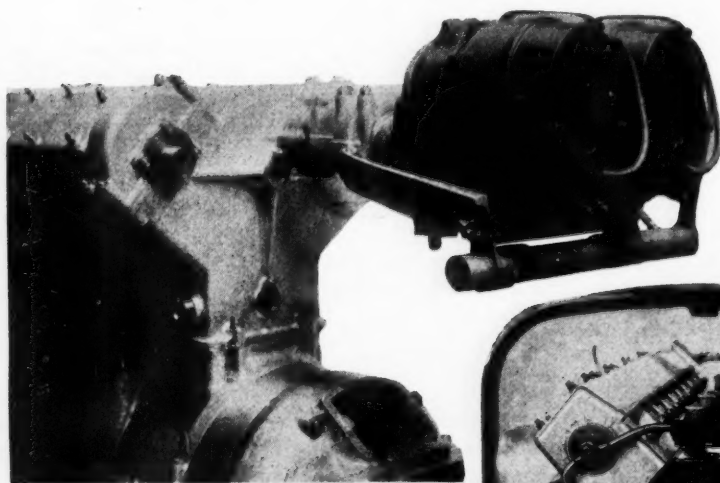
European rules stipulate that racing cars shall have a minimum width of 31 in., with two seats side by side, only one of which shall be occupied. As there is no limit on height, the Talbots have been built with the entire engine and transmission offset in the special frame, thus getting a cross section which is no greater than that of higher American racing cars.

No Separate Body

There is no separate body on the new Talbots. The two main frame members have a height of practically 10 in.; they are hand-made, hammered out cold, are united front and rear by a big diameter tube to which the extremities of the springs are attached, and both front and rear axles pass through the frame members.

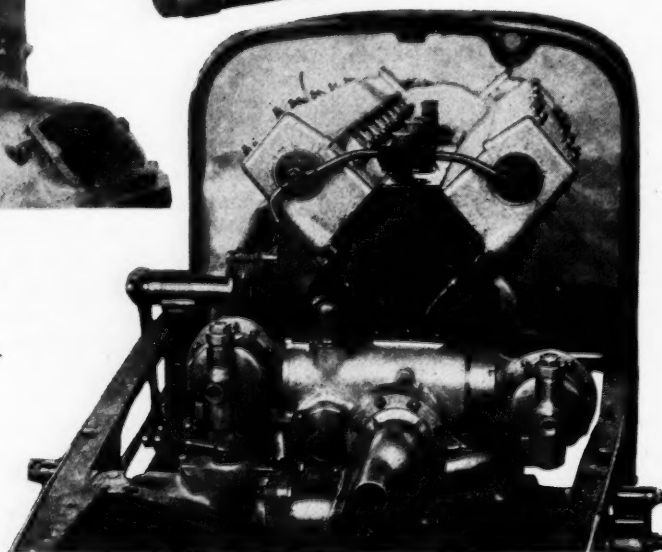
At the rear there is a cradle on which the gasoline tank is laid, being held down by a couple of steel bands, and behind the engine a metal superstructure is built on the frame, forming dashboard and cowl. Thin sheet aluminum panels are screwed into the frame, the cowl, and around the tank. The hood is hinged to the dashboard and covers both engine and radiator. The driver is seated on cushions set in the chassis. The underpan offers an absolutely unbroken surface.

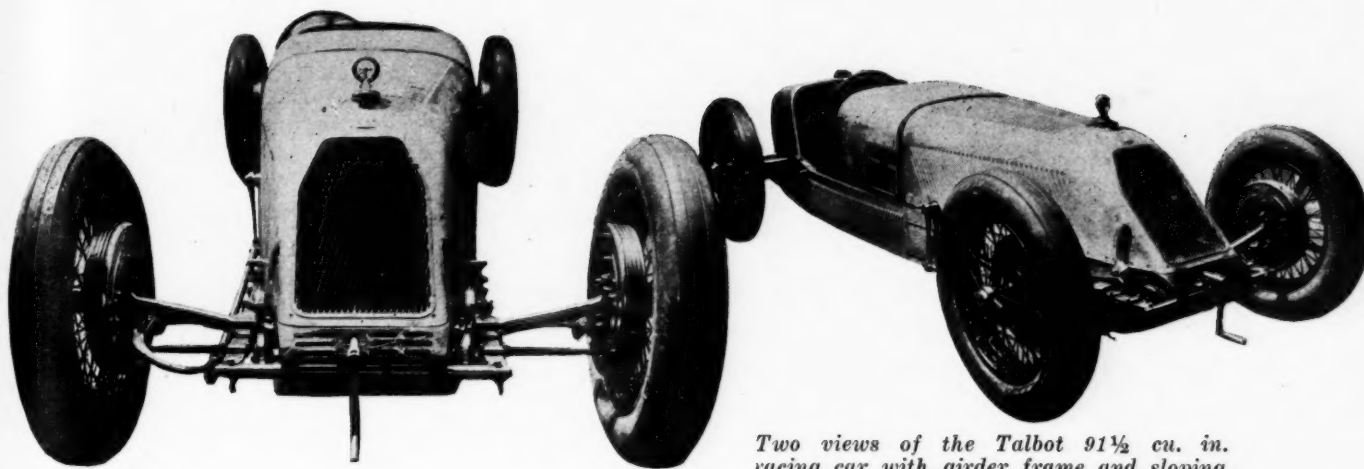
The powerplant has a certain resemblance to the previous four-cylinder Talbots and the six-cylinder Sunbeams. Cylinders are steel forgings, 56 by 75.5 mm. bore and stroke, with welded on sheet metal water jackets for each pair, the four sets being mounted on an aluminum crankcase. The assembled two-piece crankshaft is carried in nine roller bearings; connecting rods are I-section, with split ends and roller bearings and the two overhead camshafts are driven by spur pinions at the rear.



Below: Cross shaft in front driving two fuel pumps. Carburetor and blower behind frame cross member

Above: Method of mounting magnetos back of engine





Two views of the Talbot 91½ cu. in. racing car with girder frame and sloping radiator. Total height of the car is 32 in.

The peak of the power curve is said to be reached at 7500 r.p.m.

A cross shaft at the front of the engine drives an aviation type gasoline pump at each end. The water pump is driven by skew gearing off the cross shaft, and the engine is cranked through a pinion on the cross shaft.

With a flexible coupling interposed, the Roots blower is driven either directly off the nose of the crankshaft, or it can be geared up in three different ratios in relation to the main shaft. A single Solex carburetor is used, the compressor sucking through it and delivering the mixture to the cylinders through a double Y intake manifold having a blow off valve at the first fork.

Two Bosch Magnetos

Two Bosch magnetos are mounted side by side on an aluminum cradle, the rear of which is hinged to a transverse tube forming a part of the cowl and the front having a ball and socket attachment to the timing gear housing, very similar to that of the usual ball and socket torque tube head. The magnetos are driven off an intermediate pinion between the two camshaft pinions through a spherical and sliding joint, and by means of a sleeve the armatures can be advanced and retarded in relation to the engine.

By reason of this mounting the magnetos are far removed from the heat of the engine, they are directly in

front of the driver, with the distributors projecting through the instrument board, and they are not affected by any relative movement between engine and cowl.

Lubrication is of the usual double pump, dry sump type, with the main supply of oil contained in a tank forming the mechanic's seat. As this seat does not have to be occupied, a cushion is laid on the tank merely to comply with regulations.

Engine, clutch and gearbox form a unit, attachment to the frame being by means of a tube going through the front of the crankcase and by a steel banjo member forming an intermediate piece between the bell housing of the crankcase and that of the clutch. The two ends of the banjo member are received in trunnions in the frame.

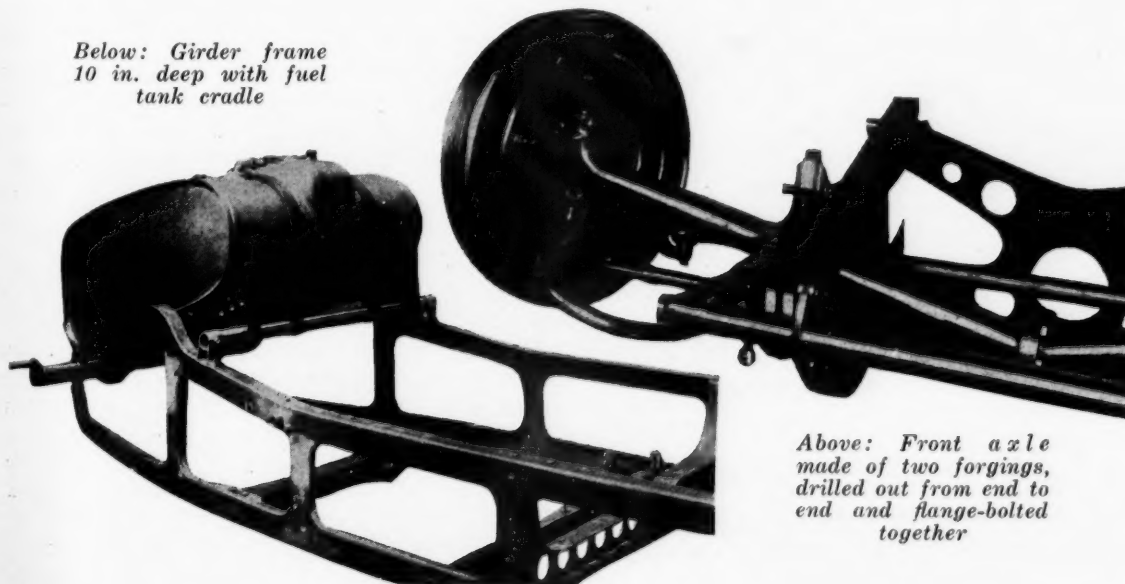
In order to get the advantage of straight forgings, the front axle is in two parts, flanged and bolted together along the center line. These forgings are bored out from end to end, and instead of the usual spring seating, the springs pass through a rectangular housing forming a part of the axle forging and are secured by wedges. Springs are of the Jonas Woodhead type, with forged eyes. At the rear the spring attachment is somewhat similar, without the use of spring clips or a center bolt.

Left and right hand steering arms are one-piece forgings and are bolted to the steering knuckles. Brakes are on all four wheels, the feature being that all the brake control gear is brought immediately inside the frame members and enclosed by the underpan, thus

reducing head resistance and at the same time making it impossible for the levers to be caught by a tire tread or a burst tire.

The cars have a track of 41 in. in front, about one inch less at the rear, a wheelbase of 103 in. and are fitted with wire wheels having drop center rims. Major H. O. D. Seagrave, Albert Divo and Moriceau will be the drivers in the three coming Grand Prix races.

Below: Girder frame
10 in. deep with fuel
tank cradle



Above: Front axle
made of two forgings,
drilled out from end to
end and flange-bolted
together

Body Builders Discuss Pyroxylin Finishes and Laws Affecting Bus Design

What the public wants in passenger car body design also considered at two-day session in Detroit. Herman Brunn elected new president of association. Products exhibited.

By K. W. Stillman

WHAT the public wants in automobile body design and what bus operators want in bus design were the two chief subjects discussed at the annual convention of the Automobile Body Builders Association held at the Hotel Statler, Detroit, June 8 and 9. To aid the members in designing and producing their products was the purpose of the other talks presented, which dealt with legislative restrictions on bus design and construction and the latest developments in body finishing methods.

The convention was augmented by an exhibit of body hardware, tools, upholstery materials, finishing materials and similar items of particular interest to body builders. Attendance was not as large as had been expected.

New officers of the association elected were: President, Herman A. Brunn, Brunn & Co., succeeding W. R. Laidlow; first vice-president, J. R. Way, of Pierce-Arrow Motor Car Co.; second vice-president, A. V. Crump, of Paige-Detroit Motor Car Co.; third vice-president, F. J. Radel, Radel Leather Co.

The new chairman of the executive committee is William E. Weppner, Brunn & Co. Other members are: E. L. Bars, Murray Body Corp.; R. H. Croninger, Yellow Cab Mfg. Co.; J. H. McPhail, Jr., Ternstedt Mfg. Co., and A. N. Merrill, Beckwith-Chandler Co.

Laidlow Opens Sessions

President Laidlow opened the convention Tuesday afternoon. The session which had been scheduled for Thursday morning was called off and the convention closed at the end of the meeting Wednesday afternoon.

The papers and discussions of the Body Finish Session covered practically the same ground as the article on automobile lacquers published in last week's issue of *Automotive Industries*.

Representatives of one car manufacturing organization and of three lacquer companies spoke and the same differences of opinion as to the relative merits of particular items or methods were expressed as were stated in our former article as being typical of the views of the industry today.

The leading paper was read by Harry C. Mougey, chief chemist, General Motors Corp. Research Laboratories, and was on the subject, "What Painting Method is Most Desirable from an Automobile Production Standpoint?"

Naturally, Mr. Mougey talked of pyroxylin finishes. He reviewed the history of the development of this type of finish from the time when his company felt the need for a durable, quick air-drying finish to replace the oil paint and varnish finishes then used.

He told how pyroxylin finishes available at that time used solvents of a nature which permitted but a very small quantity of lacquer to be used with large quantities of the

solvent in order to get a usable mixture. This had such poor covering qualities, however, that a very large number of coats were needed in order to build up a satisfactory color film.

Shortly after this, research developed other solvents such as amyl acetate which would take up suitable quantities of lacquer and also had slower drying rates so that finishes prepared with them could be applied more satisfactorily.

Cost Was Too High

An objection to amyl acetate was its very high cost, which practically eliminated pyroxylin lacquers as economic material. Research work during the war produced butyl alcohol, and butyl acetate, a product of the manufacture of the alcohol, was found to possess nearly all the good qualities of amyl acetate as a lacquer solvent and at a much lower cost.

These three factors—the need for better finishes, the development of a satisfactory solvent and the low cost production of the solvent—started pyroxylin lacquers.

Mr. Mougey said that considerable difficulty had been met in developing satisfactory lacquer primers and surfaces—particularly the former. He advised anyone contemplating the adoption of a lacquer primer to test it for adhesion in temperatures at least as low as the finish is likely to meet in service since the adhering qualities of the primer tends to decrease with temperature.

Lacquer finishes on wood parts exposed to weather have not been satisfactory, he said. This is due to swelling of the wood from moisture. Lacquer finishes do not absorb moisture as oil type finishes do so they do not expand with the wood but develop checks and cracks.

The problem of rubbing and polishing lacquer finishes is probably of most importance today, Mr. Mougey said, and he emphasized the necessity for using care in all the steps of finishing a car, particularly in obtaining good surfaces on the under coats, if a really fine finish is to be obtained with a minimum of labor.

Favors Lacquer Primers

W. J. Sohlinger, duPont de Nemours & Co., Inc., gave a short discussion in which he said that lacquer primers are better than oil because they can be applied quicker, can be smoothed easier and make a better base for the other lacquer coats. The only possible objection which can be raised against lacquer primers, he said, was the great care necessary in cleaning the metal. Sand blasting is the safest means of obtaining a clean metal surface for a lacquer primer.

Mr. Sohlinger emphasized, as did the other speakers, the great importance of skillful and careful workmanship

in every step of applying lacquer finishes in order to obtain the best results.

M. J. Pearce, of the Glidden Co., stated that, while lacquer finishes were eminently suitable for many types of jobs, there were a number of applications where the relative lack of elasticity of lacquers made their successful use questionable. For such uses he recommended a special metallic finish, which, he said, may be applied with intervals of from 30 to 60 min. between successive coats and a number of coats can be oven-dried simultaneously. The coats can be rubbed down and polished as easily as lacquer. Approximate oven drying time of a fine coat job is about 12 hr., Mr. Pearce said.

L. Clayton Hill, of Valentine & Co., stated that as a result of many severe tests, his company had proved the complete serviceability of lacquer for all finishing purposes. Lacquer primers have been tested by oven heating treated panels, then plunging them into refrigerating baths with below zero temperature and repeating the operation as many as 15 times, interspersed with bend tests. The primers were found to stand up well under these very severe conditions.

Lacquer surfaces, Mr. Hill said, are entirely satisfactory. They may be sanded to a surface as well as oil type surfaces and, as an indication of their filling qualities, he said his company recommended that no glazing putty be used to fill file cracks and similar minor depressions in the surface but only for sand or blow holes in castings.

Although Mr. Hill believes there has been an improvement in the luster possible with lacquers, he said it is still necessary to place great importance upon obtaining smooth under-surfaces. Time spent on improving the surface of the under coats will be well spent, he believes, in enabling a better final finish to be obtained with less polishing.

Operators Want Durability

Stating that bus operators are not nearly so much interested in reducing the weight of the bodies of their buses as they are in increasing their strength and power of resisting damage in collisions, Ray E. Plimpton, of *Bus Transportation* showed a slide wherein the relative unimportance of bus body first cost to total operating expenses was shown. In this chart was indicated what Mr. Plimpton believes to be a prevailing opinion among bus operators—that they are willing to pay a little more for a body in order to get one which will stand up better in service and which also will better please their patrons.

In fact, he stated, employment of better bodies is profitable in securing more patronage and increasing revenue. Another chart showed that while bus chassis weights have increased only about 20 per cent since 1921, body weights have increased nearly 50 per cent, indicating the truth of the assertion that strength and serviceability were of considerable more importance than low weight.

Among the other features of bus bodies which Mr. Plimpton cited as being of particular interest to operators were provision for handling baggage and seating arrangements. The matter of baggage accommodations is of considerable importance. The provision of a space on the roof of a bus is not entirely satisfactory, not only because it is rather inaccessible but also because it is hard to provide proper protection for baggage without adding unduly to the weight of the bus.

Mr. Plimpton said that many operators would like to have the space at the right of the driver utilized for baggage instead of using it for carrying passengers. This location is rather dangerous for passengers, since in case of collisions it is likely to bear the brunt of the impact. By placing baggage here not only would this condition

be eliminated but the baggage would be under complete control of the driver so that a checking arrangement might be employed, or at least pilfering of the luggage could be prevented. Of course the latter condition is practically non-existent with roof baggage accommodations but many buses have space in the rear and here some trouble has been experienced because of the ease with which unlocked bags may be opened by light fingered passengers.

Merrill C. Horine read a paper on the restrictions to bus design which have been made by the various State legislatures and public utility commissions. In large part his talk covered the same points as were included in the article on this subject published in the June 10 issue of this paper.

Horine Displays Slides

Mr. Horine displayed some slides to show the relative unimportance to operation of buses of the slight differences which exist between some State restrictions and the standard practices as sponsored by the S. A. E. For example, as regards the road space taken up, there is practically no difference between a bus built to the more or less standard dimension of 96 in. wide and one built for operation in Florida where width is restricted to 84 in.

Variations in height and in length are of similarly small importance and Mr. Horine suggested that because of this fact there could be no good reason for the existence of such restrictive measures.

Taking up the detailed requirements for bus design and equipment, Mr. Horine cited the many conflicting regulations which make it impossible in many instances to operate the same bus in two neighboring States. Such matters as the color, size and location of marker lights, color of stop lights, position and size of emergency doors, interior construction of the bus, including such items as guards for the driver, handrails at doors, etc., and similar items were all discussed.

In closing Mr. Horine suggested that although not many states had already gone very far in making detailed restrictions upon bus design, it was evident that the example of such States as New Jersey, Connecticut and Massachusetts, where bus regulation has been carried to the farthest extent, would be followed by other States in the near future. He said that the bus industry should recognize this fact and should take some action either concerted or individual to try to stop this flow of restrictive legislation.

He then presented a resolution which was carried by the convention to the effect that the Automotive Body Builders Association go on record as opposing any further imposition of regulatory restrictions upon bus design as being uneconomical and not in the best interests of the manufacturers, the operator or the public.

What the Public Wants

At the opening session Harold Blanchard, technical editor of *Motor*, talked on "What Does the Buying Public Want Today in Body Design?"

The main objection which the public has to present day body designs, Mr. Blanchard believes, is that the interiors of car bodies, particularly closed bodies, contain too many different materials and designs in the various furnishings and equipment, thus making impossible a general harmonious effect such as should be given by a closed car.

Citing the fact that even in the northernmost States there are relatively few days during the year in which closed cars are operated without at least one window open part way, when the car becomes of not much more protection against the weather than an open model, Mr. Blanchard said that the main argument which has caused

such a rise in popularity for closed cars during recent years is the improved appearance of such cars over open ones.

The appearance of luxury which can be obtained in a closed car is of considerably greater influence in making sales, he believes, than their greater protection against inclement weather. In effect car builders seemed to have striven for what might be called a drawing room atmosphere in their closed cars and in his talk Mr. Blanchard analyzed present practices from the viewpoint of how they harmonize with what would be considered good taste in drawing room furnishing and equipment.

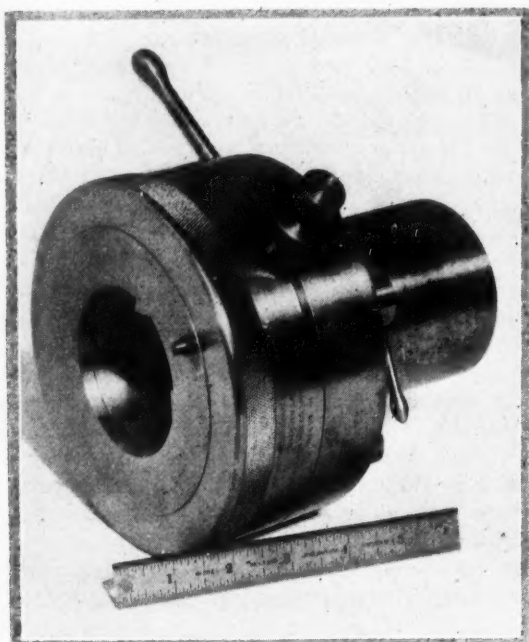
The first criticism offered was against the use of so many different kinds of materials in a single car. In the front compartment, for example, one finds polished steel,

polished aluminum, brass, natural walnut or mahogany finish, leather, mohair, rubber floor covering and half a dozen other sorts of finishes all within the compass of a few cubic feet. Mr. Blanchard believes it to be impossible to obtain a harmonious effect when such a heterogeneous mass of materials are employed.

In bringing out new body designs, Mr. Blanchard suggested, more use might be made of European ideas than has been done hitherto. Because there are very few large producers in Europe most of the cars built there depend to a large extent upon the originality of their designs for sales appeal. The designing engineers are not hampered by the necessity for fitting their designs into existing production programs and have considerable license in their design work.

New J. & L. High-Speed Die Head

THE Jones & Lamson Machine Co., Springfield, Vt., has recently added to its high speed series of die heads the No. 7-H, which is of the regular non-rotating, pull-off type and has a capacity of $\frac{3}{4}$ in. to 2 in., inclusive. This No. 7-H die head supersedes the No. 6 and incorporates



The new No. 7-H J. & L. die head

important improvements. It is specially designed to properly hold and operate the new patented high-speed chasers with ground and lapped thread form.

The die head itself, exclusive of shank, is 4 in. long and $6\frac{3}{4}$ in. in diameter. It is placed in the machine with the locking handle A on top, within easy reach of the operator. Directly underneath is the new type of adjusting screw B, of the worm and gear type, which is said to be quick-operating and highly accurate. The head of this screw is graduated in thousandths. This adjusting screw is held in the die body by a fine pitch screw, thus minimizing the travel while being adjusted. The double thread worm actuates the eccentric bushing from undersize to oversize in slightly more than one revolution. The binder C locks this adjusting screw in position.

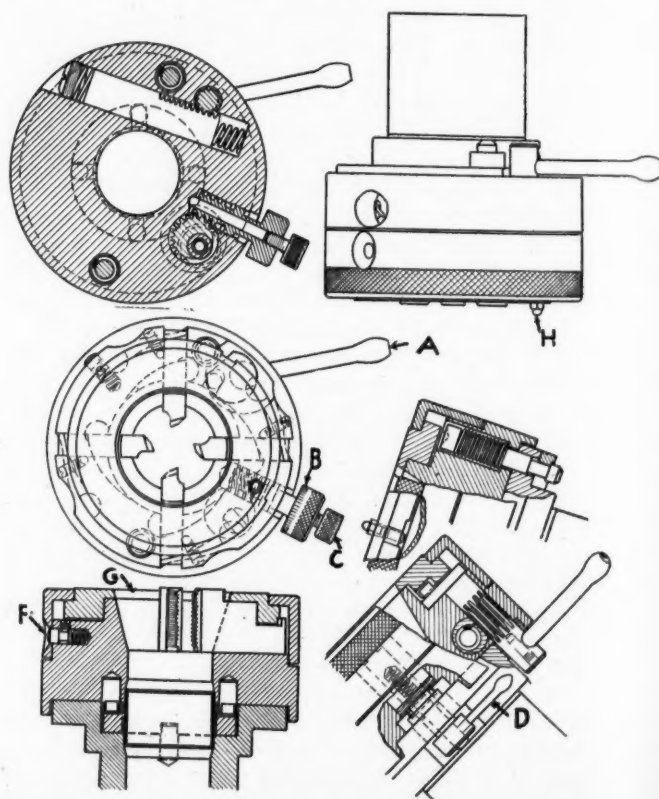
The roughing and finishing lever D is on the operator's side. The cover is locked in position by a bayonet lock E. Pressure of the thumb on button F and a slight turn of

the cover releases the lock, so that the cover readily pulls from the body, and the changing of chasers becomes a simple operation.

The cam G is of the usual construction, but with a deeper bearing on the chasers. The cam is equipped with an outside tripping button H used for shoulder work or for releasing the die when necessary.

The chasers are directly on center and have the points of the threads at a 20 deg. top rake or cutting angle. They are ground with a 20 deg. clearance angle and a chamfer or throat angle varying from 15 to 35 deg. to meet the thread depth.

A special chaser grinding jib furnished with the die is graduated to meet all grinding requirements. The thread form of the chasers is ground and lapped to give accuracy of form, diameter and lead control. For diameters from $\frac{3}{4}$ in. to $1\frac{1}{2}$ in., inclusive, the chasers are of the extension type, allowing the die to cut to a shoulder.



Sectional view of die heads

THE FORUM

Special Used Car Dealers Under Factory Franchise Suggested

Plan would rid new car dealers of used car problems and keep manufacturer's reputation back of product.

Editor AUTOMOTIVE INDUSTRIES:

Accepting the invitation for comment, pro or con, on the article "New Factory Executive Coming—He's the Used Car Specialist," permit me to express my views.

Having devoted the best part of fifteen years to automotive field promotion work, I naturally have some private opinions on the subject.

First, let's consider the new car—what is responsible for its sale; its reputation of course, and the parts and equipment that are a part of it have lent the influence which they enjoy because of years of satisfactory performance, the only true test of service.

A new man can enter a town a stranger and successfully market a standard make of car because of its reputation—not his.

Today, every new car sold comes back—to somebody. What then? Its unused mileage is what the dealer has to sell after he has taken it in trade. How much of the car is worn? How much of the reputation that was responsible for and influenced its original sale is worn, and how much is still in the car? Will that same reputation again sell that car?

Since reputation sold the car when new, reputation must again be responsible for its sale—this time more the reputation of the dealer than that of the car.

It seems to me that in order to overcome the obstacles now confronting the manufacturer and which hamper his new car sales, the old system of marketing must be again considered. For years, distributors with ample finance were chosen and given a specified territory. As time went on, the manufacturer, in order to comb the territory more closely, closed in on the distributor, reduced his territory and placed direct contracts with small dealers who (perhaps because of used car allowances becoming necessary) desired a greater margin of profit, procurable through a direct contract. This is the class of dealer that it is impossible to educate on the idea of properly reconditioning his trade-ins, for all he sees is the sale of that new car and the moving of the used car any old way to get that profit back, or as much of it as he can—for he is probably by then pinched

WE published an article on factory used car activities in our issue of April 8 last. The article contained the views of a number of factory executives on the used car problem and the extent to which the factory should cooperate with the dealer in the promotion of used car sales.

At that time we invited comments from readers who might have something further to say on the subject. The accompanying communication was written in response.

Mr. Brayton thinks the used car situation might be improved by setting up special and exclusive used car dealers under factory franchise. Others among our readers may have formulated opinions on the matter. The lists are still open. What are your ideas?

for money. Some of that profit is owing to his salesmen.

Supposing we took the used car problem entirely away from the new car dealer and created a new field, the used car field. Suppose we had two classes of dealers, the new car dealer and the used car dealer. This might be accomplished in this manner.

Go back to the old system of distribution. Select responsible men, financially and otherwise, to distribute and sell the new car product. Give them good territories. The factory representative, instead of closing direct contracts, would close sub-dealer contracts for distributors as well as keep distributors lined up on new car stock, etc.

Then, the factory's proposed used car specialist in charge of that department at the factory would be responsible for the operations of the used car field. He would close a contract with someone amply financed and located in the same town as the distributor, whose sole business would be reconditioning and reselling used cars, which would be done under the factory specialist's rules and instructions. This man could be the new car distributor himself, or, he could be on an entirely separate contract, as the manufacturer preferred.

The new car dealers and sub-dealers would not be allowed to sell used cars.

A certain trade-in value would be arranged to guide them in allowances. When the deal was closed, the car would be turned over to the used car distributor controlling that territory. Thus each dealer would be an exclusive new car dealer. Should he have a prospect for a used car, he could refer him to the used car distributor, or arrange through him to secure a reconditioned used car which would then have back of it reputation—that very essential influence which was responsible for the sale of the new car originally.

Through an arrangement with financing companies (who could more safely operate on this basis) the used car distributor would immediately pay the new car distributor or his sub-dealers for the cars turned in by them, according to the valuation shown by the trade-in value on which they were authorized to deal.

The new car dealer would not have his profits tied up in his back yard, he would not be selling used cars under false promises which were a detriment to him and injure his standing in his community. He would have capital with which to pay overhead and salesmen's salaries; there would be no disputes with salesmen about back commissions, etc.

The reputation of the automobile would be more truly maintained. The used car dealer who could then sell one and one-half as many used cars as the new car dealer sold new cars, would make a handsome profit because his volume would permit reconditioning on a conservative basis.

He, through the cooperation of the manufacturers of parts and equipment which went into that car originally to help make its reputation, would be able to restore that reputation and the public would soon realize that used car values were real values and no longer a gamble; that the old story about the first wear is the best wear was no longer true, but that future care was just as valuable as former wear.

As the new car dealer serviced his new cars, so would the used car distributor service his. This servicing could then be extended to the sub-dealer in small towns also, who could also sell reconditioned cars if arranged properly through the new car distributor.

Manufacturers of equipment which was standard on the new cars produced by the factory, would gladly lend their influence, their dealers' cooperation throughout the country and furnish at a reasonable cost such new equipment for replacement as was necessary, thus assisting in the restoration of reputation which was somewhat removed through the miles of service that made the car a used car and brought it back into the fold as a trade-in.

In short, placing the automobile business into two channels, the new and the used car business, is what is necessary. Of the two, I would much prefer the used car contract if it were handled universally on this basis.

W. J. BRAYTON,

Manager, Sales Promotion Dept.,
Willard Storage Battery Co.

Bugatti Passenger Car Largest Ever Built

ETTORE BUGATTI is now producing at his Molsheim factory (Alsace) a passenger car chassis which he claims will be the most powerful, the lightest per horsepower, and the most luxurious in the world.

Equipped with a straight-eight engine of 898 cu. in. piston displacement, developing 300 hp. at 1700 r.p.m., the chassis has a wheelbase of 185 in., a track of 63 in., and weighs 5070 lb., in full running order, with seven passenger body. The weight on the front axle is 1960 lb. The car will perform entirely on direct drive but there is an emergency reducing gear for starting on hills and an indirect geared-up drive for speeds of over 90 m.p.h.

One of the outstanding features of this chassis is the cylinder construction. The eight cylinders (4.9 by 5.9 in.) are a single casting measuring 59 in. overall, having an integral head and downward extensions carrying the crankshaft bearings, the water jacketing being brought right down to the main bearings. The entire engine weighs 770 lb.; the cylinder block weighs 237 lb. and the crankshaft 220 lb., leaving 313 lb. for all other parts.

An aluminum crankcase is built around the cylinder block, but it acts only as an oil retainer and dust excluder,

and is in no way relied on to add to the rigidity of the engine. There are three valves per cylinder, operated by an overhead camshaft with front-end drive similar to that of existing Bugatti cars.

The engine is supported from the frame members by means of three bronze hangers on each side, the bolts passing right through the cast iron cylinder block. Lubrication is of the dry sump type, with two scavenger pumps and one feed pump drawing oil from a tank contained on the engine side of the dash. Double ignition by magneto and battery, with separate coil for each cylinder, is fitted, the two being synchronized.

Clutch Separate From Engine

The clutch is separate from the engine, being in an aluminum housing under the driver's seat.

The rear axle assembly comprises an aluminum center containing the emergency gear, the straight bevel direct drive and the geared-up high, and two axle tubes. Quarter elliptic springs, having their thick end rearwards, are mounted outside the frame members and behind the axle, and in addition there is a pair of quarter elliptic jack springs ahead of the axle and under the frame members.

The front axle is of a type used on Bugatti racing cars. A straight forging is bored out and bent to shape, and the hollow ends are then closed by hammering, sufficient metal having been left to provide for this. The semi-elliptic front springs, which have forged eyes, pass through the axle. The rear attachment of the springs is between two semi-circular bronze blocks. The side rails have a height of 10 in. and are 4 mm. thick.

Low pressure straight side tires have been built specially for this chassis by the Rapson Co. of England. They are 39 by 7 in. and are mounted on aluminum wheels forming an integral casting with the brake drum. By reason of the size of the drum the spokes are very short and are helically disposed to assist in cooling the tire. This type of aluminum wheel has been used on Bugatti racing cars for two years.

Owing to the length of the engine, the body space looks rather small. To show that it is adequate, Bugatti has fitted on the first chassis the biggest phaeton body built by the Packard Co., but has placed it rather farther ahead of the rear axle than it is on the Packard car.

IN a recent paper on "Piston Temperatures in High Speed Gasoline Engines," Prof. A. H. Gibson, of Victoria University, Manchester, said that when trying out air-cooled engines it had been suggested that phosphor bronze cylinders should be tried. Accordingly three cylinders were made from the same pattern, of cast iron, aluminum alloy and phosphor bronze copper alloy, and, curiously enough, the last mentioned proved the hottest and worst of the three. When the use of this alloy was suggested the argument was that the metal had an excellent wearing surface, that the ribs would be very efficient heat conductors, and except for the fact that it would be very heavy the cylinder should be a good one. At the conclusion of the tests some of the phosphor bronze copper alloy was sent to the National Physical Laboratory, and that institution informed them that its conductivity was lower than that of cast iron, which was a great surprise.

IN order to round out its service to the automotive and industrial fields, Standard Steel and Bearings, Inc., Plainville, Connecticut, has added to the "SRB" annular ball bearing line a complete series of thrust bearings identified by the trade mark "M-R-C."

To Fix Territorial Sales Quotas

FIND OUT

1. How many people in the territory want your product, or can be made to want it.
2. How many people in the territory are able to buy it.

By H. G. Weaver*

Assistant to Director, Sales Section,
General Motors Corp.

MARKETING effort to be of greatest value in promoting sales must rest upon a foundation of market economics. In the absence of adequate knowledge of the market and the economic factors governing the purchase of the product, artistic layouts and well-written copy are of little avail. High pressure salesmanship cannot get business where there is no business to be had.

We quota men are a vital part of the great marketing machinery, but our work has to do with the less dramatic phases of the problem. It relates to the basic market foundation upon which advertising and selling must rest if they are to attain the fullest efficiency by broadening markets and reducing the cost of distribution, thereby serving business and society most effectively.

Getting down to the specific subject of sales quotas, just what do we mean by the word "Quota"? To my mind, the most satisfactory definition is this:

"Quota means that portion of the market that we can reasonably expect to get."

This definition at first glance is simple enough, but it leads into another question, namely, just what do we mean by the word "market"? Do we mean the quantity of goods that is being sold or the quantity of goods that *has* been sold; or the quantity of goods that our competitors are selling; or the potential capacity of the market to absorb?

Generally speaking, I am not in sympathy with the practice of basing quotas *entirely* on performance because such a practice from the broader viewpoint amounts to using the thing to be measured as a measuring stick of itself. Nor am I in sympathy with sales quotas that are based wholly on what competition is doing. If modern marketing effort is fully to justify itself in an economic sense, by rendering a real service to society, it should not dissipate all of its force in merely attempting to offset similar activities on the part of competition.

* Portion of a paper presented before the Sales Executives' Division of the American Management Association.

Merchandising should expand markets and improve standards of living by creating industry where industry did not previously exist. Nor is this incompatible with the selfish viewpoint of the individual company because it is usually more profitable to expand sales effort in neglected markets than in a territory that is already yielding a return proportionate to its purchasing ability.

The procedure in determining territorial potentiality must be different for each different type of product. I have little patience with the "ready-made," "hand-me-down," quota. There is no panacea. If a given factor affords a reliable index to the market for Ivory Soap, that alone would disqualify it as a guide to the sale of Cadillac automobiles. Rarely do we encounter two marketing problems that are identical in detail. Fundamentally, however, the factors controlling the market for any product in any territory may be expressed quite simply in terms of a general law involving only two considerations.

These considerations are as follows:

1. The need or desire for the product—which may be real or imaginary—latent or active.
2. The ability to buy the product.

The first consideration involves a special analysis for each individual type of product. In such an analysis the psychology of the market must receive special attention.

The second consideration, namely, the ability of the people to buy the product, depends upon some adaptation of purchasing power data irrespective of the nature of the product or commodity. Even the mediocre

salesman follows out the foregoing line of reasoning in evaluating the individual as a prospect. Consciously or subconsciously he asks himself the questions—first, "Can this man use my produce?" second, "Has he the money or credit with which to buy it?"

Since a territory, from a marketing standpoint, is nothing more than an aggregation of individuals, our solution to the problem of territorial potentiality lies in the answer to two similar questions, namely:

"GENERALLY speaking, I am not in sympathy with the practice of basing quotas *entirely* on performance, because such a practice from the broader viewpoint amounts to using the thing to be measured as a measuring stick of itself," says Mr. Weaver.

"Nor am I in sympathy with sales quotas that are based wholly on what competition is doing. If modern marketing effort is fully to justify itself in an economic sense, by rendering a real service to society, it should not dissipate all of its force in merely attempting to offset similar activities on the part of competition."

"How many people in this territory want it, or can be made to want it?"

"How many people in this territory are able to buy it?"

In this connection we have always found it good practice, in testing out our theories, to apply a common sense check by going back to an individualistic conception. Let us assume that we have one company, one customer, one salesman; and then analyze our theories in the light of such a condition.

I do not want the foregoing statements regarding the individual conception to be interpreted as meaning that I advocate simplicity as a necessary quality of the quota formula.

We, in the field of market analysis, should interest ourselves in finding something that will work rather than something that is simple. Of course, both qualities are desirable but in the case of the majority of products the problem is too complicated to permit of simple treatment. "Better be right than simple" is a good slogan for the statistician to bear in mind when attempting to develop a basic index to territorial potentiality.

When it comes to the question of accuracy, the greater the accuracy of the estimates the greater the value of the work, but in this there is a point of diminishing returns because the degree of accuracy, generally speaking, is governed by the amount of money that is spent in gathering and developing the data.

It is the purpose of quotas to save money. If the cost of development exceeds the savings effected, then the purpose is defeated. It is debatable if a set of figures that were 100 per cent correct (if such a thing were possible) would be any more useful than a set of figures that were only 95 per cent correct.

The problem must be dealt with in a broad style. The primary requirement is that such figures shall represent a constructive guide to the allocation of sales and advertising effort. Potential market indices are expressed in quantitative terms but perhaps their greatest value lies in their qualitative aspects. Let us say, for example, that a given territory has an estimated potential capacity sufficient to absorb 1000 automobiles a year, whereas total actual sales are at the rate of only 500 a year. It makes very little difference whether the potential figure of 1000 is absolutely accurate or not. The correct estimate might be 900 or it might be 1100. This need not disturb us; the main point is that here is a territory offering an opportunity for expansion and from a practical selling standpoint the course of procedure would be the same irrespective of whether the figure were 900, 1000 or 1100.

Let me repeat that hair-splitting accuracy is usually too expensive to be commercially practical. On the other hand let us not be too willing to blame the raw economic data when our territorial problems seem to defy solution.

Iron, steel, gasoline, rubber, bronze—in fact all material things behave according to certain fixed laws. When theory and practice fail to coincide it is because

"IRON, steel, gasoline, rubber, bronze—in fact all material things, behave according to certain fixed laws. When theory and practice fail to coincide it is because we have not gone deeply enough into the true theory.

"Figures likewise behave according to definite mathematical rules which are the same yesterday, today and forever. Some of these rules were discovered only recently; others are yet to be discovered. The existence of law and order, however, cannot well be denied and in the far distant future, when a knowledge of all the underlying principles has been appropriated as a part of our working equipment, the difference between 'theory' and 'practice' will fade away."

we have not gone deeply enough into the true theory.

Figures likewise behave according to definite mathematical rules which are the same yesterday, today and forever. Some of these rules were discovered only recently; others are yet to be discovered. The existence of law and order, however, cannot well be denied and in the far distant future, when a knowledge of all the underlying principles has been appropriated as a part of our working equipment, the difference between "theory" and "practice" will fade away.

In General Motors the material that we use in estimating the distribution of purchasing power by counties is as follows:

1. Total population.
2. Total value of farm products, minerals, fisheries and value added by manufacture.
3. Number of retail outlets.
4. Number of income tax returns.

A lesser number of factors was found to be inadequate and the use of additional factors was proven to be unnecessary.

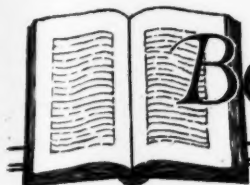
Our method of estimating purchasing power by counties, on which we received the Harvard Award, was nothing more than a distribution of income by counties. We started off with the state estimates prepared by the National Bureau of Economic Research and projected them to date. We then computed the average income of the average state for the last five years. Then we proceeded, through the use of data that was available by counties, to develop a rule of thumb method whereby we might estimate that which we already knew.

Just at this time we are doing some especially interesting work in connection with the distribution of county income as regards the number of people who receive incomes of different sizes. In other words, how many people are there in each county in the United States who make from \$1000 to \$1100; from \$1100 to \$1200—from \$4000 to \$5000 per annum, etc., etc.

Income Tax Return data is utilized in these studies but our methods provide a means of correcting for probable tax evasion and the estimates in the lower brackets (\$1000 to \$2000) are not influenced by tax return data except in a very remote way.

A TOTAL of 21 European racing cars have been entered for the Spanish Grand Prix which takes place at San Sebastian on July 18. This list is made up of three Delage cars, three Bugatti, three Amilcar, three Graf-Soriano, an Eldridge Special, four Sima-Violet, two Guyot Specials, a Becquet and the 12-cylinder Sunbeam in which J. C. Parry Thomas recently set new records for the kilometer and the mile in England.

For the Grand Prix d'Europe, scheduled for July 25 at San Sebastian, the following cars have been entered: Three Delage, three Bugatti, three Darracq, four Sima-Violet, an Eldridge Special, two Guyot and three Graf-Soriano. The cars for this event are all fitted with engines not exceeding 91½ cu. in. displacement, whereas most of the cars in the Spanish Grand Prix will be larger.



Books for the Business Bookshelf

Causes and Cures for Corrosion

Corrosion—Causes and Prevention. Frank N. Speller. McGraw-Hill Book Co., New York. 621 pp. illus. \$6.

IT has been estimated that waste of metals during 1924 due to corrosion alone reached the vast total of 50,000,000 tons. With the rapid depletion of high grade ore supplies and the tendency toward lower profit margins this enormous waste assumes large proportions. Up to the present time very little organized research work has been carried on for the determination of the causes of corrosion and means of preventing it. The present volume is in large part a collection of much of the available material on the subject so arranged and classified that it is clearer and better adapted for practical use by those who have not studied the subject in detail.

The book first takes up the nature and mechanism of corrosion and the theories which have been offered concerning it. Then follow chapters on the influence which various factors such as methods of manufacture and treatment, composition of the metal, etc., have upon corrosion. A classification of corrosion, and principles and methods of testing for corrosion then follow.

The second part of the book is confined to preventative measures and includes chapters on prevention under various conditions such as in the atmosphere, under water, in steam and hot water systems, etc. A very complete bibliography will prove valuable to those who desire to make more detailed studies of the subject than can be based upon this book alone.

For Users of Hides and Skins

Hides and Skins. John R. Arnold. A. W. Shaw Company, Chicago. 606 pp. illus. \$6.

THIS is the first volume of a series of studies on the raw material markets of the world which will place emphasis upon those raw materials whose principal sources are under the control of foreign nations. After a general review of the fundamental principles necessary to an understanding of the industry as a whole the author discusses the basic physical qualities of hides and skins and how they affect the market. Then the path of the product is traced to the market—through what hands it passes, cost increments added by transportation, how purchases are financed and sales made, grading and specifying practices, etc. Following this is a comprehensive survey of the restrictions and formalities to be observed in international trade, duties to be paid, best ways to pack and ship. Finally Mr. Arnold points out the origin, production, distribution and general characteristics of each class of hides or skins. As a source of information about the extent and characteristics of the world markets for hides and skins, Mr. Arnold's book should be valuable to anyone using leather, hides or skins in his manufacturing processes.

Study of Para Rubber Tree

A Pathological Study of the Para Rubber Tree (*Hevea Brasiliensis*) in the Amazon Valley. James R. Wier. United States Department of Agriculture. 129 pp. illus. 50 cents.

OF particular value to those who are interested in or who are contemplating an association with the rubber producing business is this bulletin from the Department of Agriculture which discusses the diseases to which

rubber trees of the Amazon valley are subject and methods for preventing and curing them. Mr. Wier was pathologist of the expedition of the Department of Commerce and Agriculture to investigate the sources of crude rubber in the Amazon valley and so has had an excellent opportunity to make a study of the conditions prevailing there—probably the first real investigation of Amazonian rubber pathology which has been made.

Succeeding in Business

Assuring Business Profits. James H. Rand, Jr. B. C. Forbes Publishing Co., New York. 245 pp.

ONE more addition to the already long list of publications which assure business success to their readers has come from the press. This latest book has the advantage over most of its class since the author, James H. Rand, Jr., as the active head of a business concern, is in a much better position to make authoritative statements concerning the essentials of business success than is the usual run of authors of "success" books.

In spite of his authority, however, it is very doubtful that anyone not already on the road to success will be enabled to find the road through reading Mr. Rand's book. Success in any line of activity consists of much more than strict adherence to a set of rules and the formulation of such rules is about the limit of service which can be performed by such a book as "Assuring Business Profits."

All of the old copy book maxims for attaining success are rehearsed under new disguises but in addition Mr. Rand makes a number of statements which will give the reader considerable food for thought. For example, it is the author's opinion that if an executive does not make an outstanding success within ten years he will never make one; every business should have two sales managers, one for old customers and one to obtain new customers; if 20 salesmen are wanted 100 should be hired, etc.

Properties of Ferrous Metals

Principles of Metallurgy of Ferrous Metals. Leon Cammen. The American Society of Mechanical Engineers. New York. 145 pp. \$2.00.

ALTHOUGH it is not necessary for an automotive engineer to possess detailed metallurgical knowledge, it is essential that he should have considerable information concerning the properties of the metals he uses for various purposes and how and why these properties are obtained. This is particularly true of ferrous metals because of the immense variety of materials which have been produced in recent years. The great range of properties which may be obtained through varying the carbon and (or) alloy contents and heat treatments make it possible now to produce practically any kind of metal to answer any requirements.

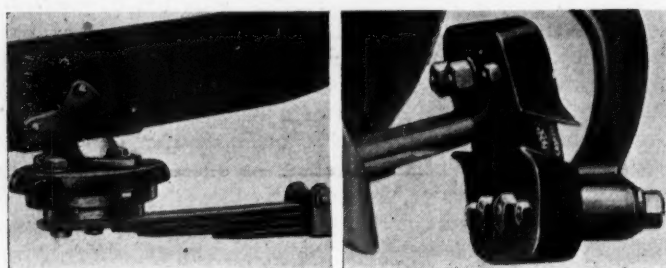
How this is done, why it is done and what effect the variation of any property has upon other properties of the metal are important things for designing and specifying engineers to know if they are to work at best advantage. To give such engineers a working knowledge of metallurgy as applied to ferrous metals the above book has been written. It is not excessively technical and will be readily understood by any engineer with a general knowledge of strength of materials, material testing methods, etc. The book leaves the reader with a rather clear picture of present practices, theories and results.

New Developments in Automotive

Fabric Spring Shackles

BELFLEX fabric spring shackles have been adopted on the Willys-Knight Great Six Model "66" line to connect the chassis springs with the frame in place of the usual shackles and bolts. All models in the "66" line except the touring car are now being produced with the Belflex equipment.

According to the officials of the company, the Belflex system was adopted to eliminate practically all chassis



Installation of Belflex spring shackles at front and rear of rear spring on Willys-Knight Great Six

lubrication, to make the car quieter, specially over uneven roads, and to provide a more flexible connection between the springs and frame. This system consists essentially of two resilient rubber fabric strips clamped between the springs and chassis frame.

The style of application is the same as the conventional metallic arrangement, the front of each spring being anchored in a flexible manner to the frame with the rear of the springs provided with a tension shackle which permits lengthening or shortening of the spring as the load varies. The front shackle, due to its flexible nature, allows a gentle rocking as the spring flexes.

New Metal Tinning Compound

A REPORT on tests made on Soldo compound, manufactured by the Soldo Co., Sicilian House, Southampton Row, London WC-1, has been made by the National Physical Laboratory. This compound is said to be of particular value in tinning bearings preparatory to babbitting, as it gives a very secure joint. At the National Physical Laboratory joints obtained by tinning with Soldo were compared with joints obtained by the ordinary tinning process, principally by microscopic examination of the extent of inter-penetration.

Soldo compound is in the form of a grayish-white powder and consists of a combination of flux and metal which is non-acid. The method employed in using the compound consists in heating the metal in a gas flame to a temperature judged sufficient. It is then removed and Soldo sprinkled over the area to be tinned. According to the report of the Laboratory, when this was done the powder evolved fumes, appeared to melt and rapidly produced a continuous tinned surface. One application was sufficient with commercial rolled strip of phosphor

bronze, Ohmal strip rolled at the National Physical Laboratory, commercial rolled strip of manganese bronze, flat bar machine steel and machined cast iron. With rusty steel, successful tinning was obtained after two or three applications of Soldo, assisted by rubbing with a soldering iron. Rusty cast iron was also tinned successfully after similar treatment.

Microscopic examination of joints showed interpenetration of the tin and metal in all cases. With manganese bronze the extent of the interpenetration was observed to be 4 to 5 times, and with phosphor bronze approximately twice as great as when an ordinary workshop method of tinning was employed.

Bullet-Proof Fuel Tank

TESTS have been made at McCook Field of the Pescara bullet-proof fuel tank which is expected to give partial protection against fire on aircraft. In addition to being bullet-proof and leak-proof, the tank is detachable, so that in the event of a forced landing, it may be dropped before the plane reaches the ground. The Pescara tank operates by means of two rotating cylinders, one within the other, which form the walls of the tank. When the cylinders are pierced, a mechanism moves the inner cylinder round, approximately 4 in., so that the holes in each cylinder are covered by the walls of the other. During the tests, although the tank was pierced repeatedly by machine-gun bullets, none of the contents, it is reported, leaked out.

Passenger Car Ventilator

THE Adlake ventilator, a new product of The Adams & Westlake Co., New York, has been designed for use on closed passenger car bodies in order to provide adequate ventilation under all sorts of weather conditions. The ventilator is weather proof and does not need to be closed during bad weather. It is built into the roof of the car and is so constructed that it projects a little more than an inch above the roof line. The under side contains a combined register and dome light and does not project lower than the conventional dome light. A shutter is provided so that the flow of air can be regulated. During a test with a five-passenger sedan with four occupants the air changes per hour through an Adlake ventilator varied from four at 10 m.p.h. to a little over ten at 40 m.p.h.

Oxy-Illuminating Gas Torch

ILLUMINATING gas has been adopted at the Schenectady plant of the General Electric Co. as a substitute for acetylene, hydrogen and other fuel gases in combination with oxygen for metal cutting, following a comprehensive study of the economic needs of the various classes of work. A special oxy-illuminating gas torch was developed for the purpose, and is now being used for cutting risers in the steel foundry of that plant, varying in thickness from 1 to 20 inches.

Parts, Accessories, Tools, etc.

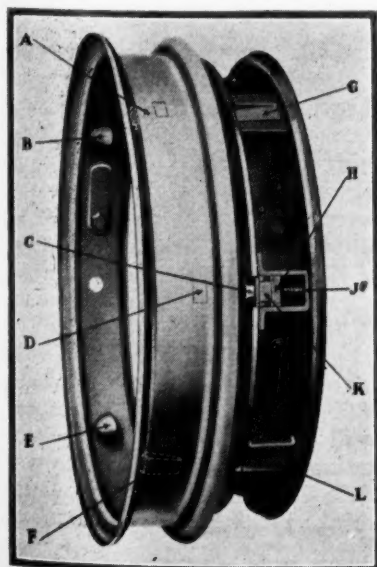
This method is also used on machines in cutting intricate shapes from steel plate. It was found that illuminating gas is cheaper in machine cutting than either hydrogen or acetylene, while the speed of cutting after once starting is approximately equal for all gases. The advantages of the use of illuminating gas were found to be (1) availability; (2) elimination of delays and handling of tanks; (3) low cost; (4) safety, and (5) chemical and physical properties permitting its use in a torch equipped with a superheater, thus effecting marked economies in the amount of oxygen required by the cutting jet.

New Quick Demountable Rim

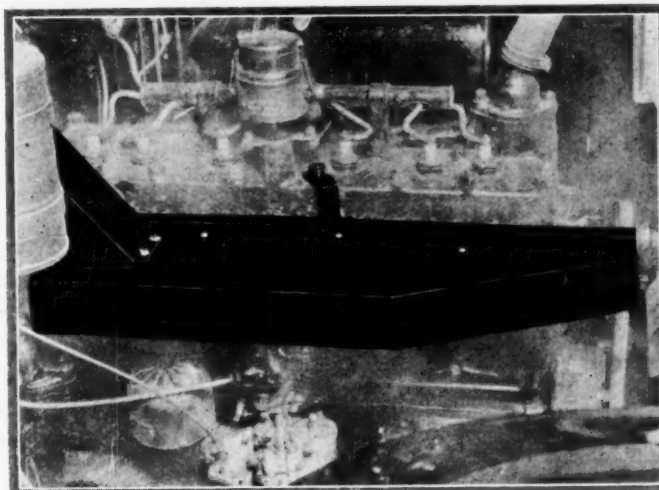
LESS than a minute is said to be required to demount and replace an automobile rim with tire on a new wheel and rim assembly manufactured by the Kaplan Wheel Co., of Detroit. One bolt only is employed on the rim, this accomplishing the drawing up of the rim on the felloe and the final locking. The assembly is adaptable to artillery, wire or disk wheels, according to the manufacturers, and on a production basis can be produced with comparatively few changes in present equipment and at no increase in the cost of manufacture.

To demount one of the new rims from its wheel, it is necessary only to make a few turns on the single bolt, pull on the rim at the locking device and lift the rim off the wheel to clear the valve stem in the usual manner. Mounting is accomplished in a similar manner.

Referring to the photo-diagram, as the rim in its proper relative position is lifted onto the wheel, inclined wedging members *A* and *F* enter grooved surfaces *G* and *L* on the felloe. At the same time, convex inclined surfaces *B* and *E* enter corresponding concave inclined surfaces on felloe. The fixed locking bolt *C* on the wheel moves both the threaded nut *K* and wedging member *H* backwards to final locking position. The bracket *J* with inclined guides raises the wedging member *H*, bringing the rim to a fully locked position on the felloe.



Kaplan wheel and rim assembly



Installation of American Injector heater on Chrysler "70" engine

Line of Car Heaters

MANIFOLD automobile heaters suitable for installation on practically all popular makes of cars are now being produced by the American Injector Co., Detroit. Several of the models are provided with instrument board control and all are supplied with a shut-off register of cast aluminum.

New Storage Battery Cell

A STORAGE battery cell which permits of cleaning out the sediment without taking the elements out of the cell has been invented by J. L. Lange, of Dumont, N. J. The inventor evidently has been working on automobile batteries, for his patent shows a three-cell battery. As a rule the cells of such batteries are formed with two ribs on which the plates rest and which divide the lower portion of the cell into three compartments in which the active material shed by the plates settles. According to this invention the cell is formed with a threaded opening at about the center of each of these compartments, which is closed by a threaded plug with head. When a considerable amount of sediment has accumulated at the bottom of the cell, both the drain plugs in the bottom and the vent or filler plugs in the top are removed, which allows the electrolyte to drain out.

Liquid Packing Compound

A LIQUID packing compound known as "Osotite" and marketed by an English concern produces a high pressure joint between two metal surfaces without the use of the conventional copper-asbestos gaskets or other forms of packing and cements. This compound resists the temperature and explosions occurring in automobile combustion chambers. It may be used wherever gaskets or washers are employed on automotive vehicles for the purpose of making oil tight joints and is recommended for use in commercial high pressure gas, steam or water lines.

75 Per Cent of Crankcase Oil Reclaimed by New Clarifying Device

Lighter petroleum products driven off by distillation while
water and sludge are removed by gravity.

A DEVICE known as the Wiederhold Velvet Oil Klarifyor has been placed on the market by the Wiederhold Company, 3917 Bellevue Ave., Detroit. The reclaimer comprises two filters which contain material suitable for filtering and clarifying used crankcase oil. Lighter petroleum products are driven off by distillation while water and sludge are removed by gravity.

The reclaimer has a capacity of 2.5 gallons of reclaimed oil per hour, and the cost of the process is said to average 8.5 cents per gallon. A given quantity of crankcase drainings yields 75 per cent of that amount of reclaimed oil, the viscosity of which is 300 or over. In addition, a light oil is recovered which may be used either as fuel or as a lubricant for typewriters, fire-arms, etc. Approximately one gallon of this light distillate is recovered from 20 gallons of crankcase oil.

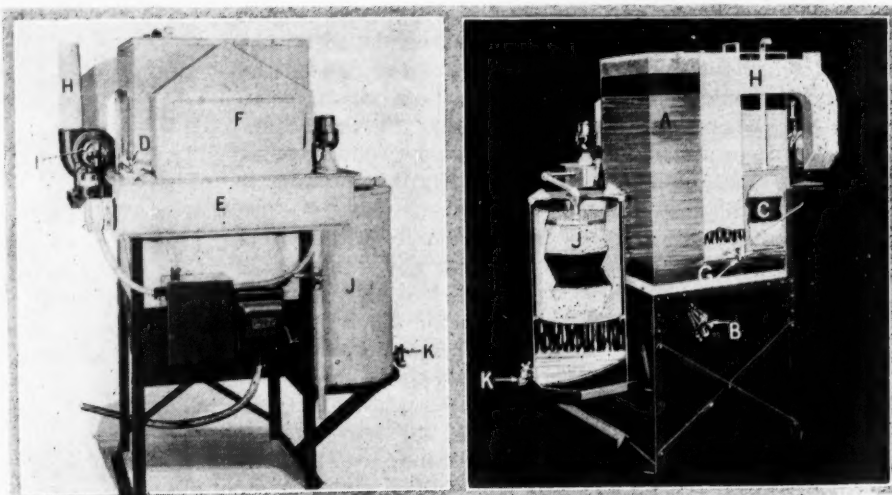
It is stated that the reclaimed oil is uniform in quality and that only the quantity varies. The operation of the "Klarifyor" is as follows: The crankcase oil is poured into a tank A where the water and sludge settle to the bottom and are removed by occasionally opening a bottom drawn valve B. The tank is U-shaped and the oil, seeking its level in both legs of the U, passes up through the first filter C which has a relatively high porosity. The filter packing removes much of the colloidal carbon.

An adjustable valve D then slowly admits the oil to the heating chamber E, which extends horizontally across the front of the machine. Under the chamber is an electrical heater of the resistance bar type. It is controlled by a thermostat which maintains the heat of the chamber at 350 deg. Fahr.

The heat vaporizes the lighter, non-lubricating components or diluents of the oil, which are drawn by fan suction through a fume hood F. The fumes are conducted through a series of baffle plates which condense the light oil distillate, the latter being drawn off through the tap G. The remaining vapors, containing gasoline, kerosene and the paraffine bases released through decomposition in the automobile engine of paraffine base original oils, are carried out through the passage H and expelled into the open air. In the phantom picture the small pipe extending diagonally down to the tap serves to carry off a slight additional condensation of light oil that

occurs when the vapors pass through the fan I.

The fume passage and light oil condensing chamber are located between the two arms of the U-shaped oil tank. By this arrangement the heat of the outgoing vapors is transferred to the crankcase oil, raising its temperature by 50 deg. before it reaches the heating chamber and thus



View of Velvet Oil Klarifyor. Right. The Klarifyor in phantom. This is a new device for reclaiming crankcase oil which has been developed by the Wiederhold Co., Chicago. Distillation and gravity are used in the process

reducing the amount of electrical energy used by the heating chamber.

Meanwhile, the remaining oil, having resisted the distillation process, is flowing slowly from the heating chamber into the second and larger filter J. There it passes downward through a more closely packed filtering medium impregnated with a clarifying compound. This removes the remaining colloidal carbon and the asphaltum bases released in the partial breaking down in engine service of original asphaltum lubricants. The refined and filtered oil then drips from the exit tap K, ready for further service in the automobile engine. The chemical compounds used in both filters are said to be entirely neutral.

The life of the filters varies somewhat with the grade of crankcase oil reclaimed, but the small filter C needs replacement after about 300 gallons has been treated, while the larger filter J will handle 100 to 150 gallons before replacement. The reclamation cost of 8.5 cents per gallon includes labor, electric current and filters. Both the machine and the filters are made by the Wiederhold Company.

EDITORIAL

The Last Six Months

INDUSTRY is nearly ready to turn into those last six months of 1926 about which everybody has been talking so much for a year past and about which there has been so much fretting and worrying. Now that they are upon us, their roar, which from a distance seemed so terrifying, has died down to something like normal tones and their aspect has in it little that is ugly and nothing that is frightening.

Further production declines in the automotive industry are almost certain while moderate curtailment in many lines of industry seems likely. Probably the automotive curtailment will be slightly in excess of seasonal proportions, but there is nothing to indicate a slump or depression of any size. Good business for the last half of the year seems sure, although further record-breaking is unlikely—or at least might prove undesirable.

Dealers continue to feel the pressure of used car stocks although some relief has come since the advent of good weather and inventories of both new and used vehicles have moved reasonably well in recent weeks. It must be remembered, however, that even during the record breaking first quarter, ten or fifteen companies, some of them strong, large organizations, failed to register as many new cars as they did during the first quarter of 1925.

Practically all of the business economic services, however, agree now that there is little to be feared from the last six months of 1926. The tone of all of these services, while conservative as to predicting further advances for business, is more optimistic and less worried about possible major declines than a few months ago. The last six months should result in sound, profitable, and reasonably numerous sales for the automobile manufacturers.

Preferred Numbers

A PHASE of standardization which has been given particular attention abroad is that of preferred numbers. This is closely related to the simplification-in-industries movement which is being fostered by our own Government.

In all industrial products which must be made in a series of sizes, it is, of course, desirable to have the number of different sizes made the smallest possible which will meet all reasonable demands. It is generally agreed, in the abstract, that the whole range of requirements may be covered with the least number of sizes to the best advantage if the different sizes form a geometrical series. That is, in the case of shafts, screws, pins, tubes, etc., we can get along with the smallest number of sizes if each succeeding size is larger than the preceding one in a fixed proportion.

Primarily, of course, the capacities for carrying loads of the particular kind involved should increase always in the same proportion. The capacities are proportional to the squares of the diameters in the case of tensile and compressive loads and to the cubes in the case of torsional loads. The squares and cubes, of course, increase in entirely different proportions from the diameters themselves, but if the diameters increase always in the same proportion then the squares and the cubes will each also increase in constant proportion, and so will the load capacities. In that case the maximum deviations, on a percentage basis, which must be made from the theoretically required sizes in order to use standard sizes, are the same throughout the range.

When it is attempted to apply this plan of standardization or selection of sizes objections are usually raised. This is due to the fact that an increase in diameter from 2 to 2½ in., for instance, seems much greater than an increase from ½ to ⅝ in. It is true that in absolute measure the step is much greater, but relatively it is the same. There are probably two reasons for the state of mind which makes engineers consider the jump from 2 to 2½ in. diameter a much greater one than that from ½ to ⅝.

The first is that up to now we have always used arithmetical series of sizes. Our standard cap screw sizes, for instance, increase in steps of 1/16 in. up to ⅝ in. and in steps of 1/8 in. above that up to 1¼ in.

The other reason is that when an automotive engineer uses a shaft of one of the larger sizes he has to deal with, he will carefully calculate the stresses so as not to introduce unnecessary weight, whereas if the load calls for a shaft of ½ in. or less he will be far less particular, because less is at stake.

Going to Extremes

WHEN cars are being built in large numbers, certain little faults in the design are multiplied a great many times, as it were, and complaints about them from users naturally are numerous. These complaints, which reach the engineering department by way of the service department, often cause the former to go to unnecessary lengths in eliminating the fault in a new model. We remember, for instance, a case some years ago where a popular car was somewhat over-gear, so that the engine did not handle it well on grades. The next year the rear axle ratio was changed so much that the engine raced unpleasantly whenever it was under light load. A similar case pertaining to another feature has come to our attention quite recently. The tendency of designers to jump from one extreme to the other is perhaps a natural one, but should be avoided wherever possible.

AUTOMOTIVE **NEWS SECTION** INDUSTRIES

Philadelphia, Pennsylvania

Thursday, June 17, 1926

Continuing High Sales Level Holds Industry on Firm Basis

PHILADELPHIA, June 17—The automobile and allied industries are showing the normal seasonal trend. Both production and sales of new cars are gradually declining, but the level is still high enough to cause general satisfaction. The trade always expects to pass the sales peak in April or May, and is pleased if the recession proceeds in an orderly manner with no sudden slump in demand. This, from all indications, is the condition today.

From a production standpoint the car industry offers a most unusual spectacle. It is, of course, generally known that all companies are not sharing equally in the sales gains that have been made this year over last. But there is a mistaken impression that the large-volume producers have nearly all gained at the expense of the small companies. The fact is that most of the greatest advances in percentage volume have been made by comparatively small producers who have products with a strong individual appeal.

With the big companies differing widely in production rates in relation to plant capacity, the business of the equipment makers is likewise spotty, some being approximately on the level of last year's volume at the corresponding time, and others operating nearly double.

In accessories and service parts the trend is still upward, in line with the seasonal tendency toward more use of the cars in service. A number of the car manufacturers are considering entrance into distribution of accessories and tires, which they would buy in bulk and sell through their dealer organizations. The widespread adoption of such policies would cut heavily into the business of automotive jobbers and tire branches and would involve sweeping changes in the distributive scheme of the industry.

Tires are selling at a record low rate for this time of year. Manufacturers and branches are heavily stocked, but the replacement trade has been so slow for many months that the general impression is that warm weather will bring such a rush of buying that shortages will quickly result.

Form Alloy Steel Company

MARION, OHIO, June 16—Alloy Cast Steel Co. has been organized here to manufacture high grade electric steel castings in carbon, manganese and other alloys. The company has taken over the electric steel foundry of the Fairbanks Steam Shovel Co. and it is being overhauled and enlarged to provide for 400 tons of steel casting a month.

The organizers of the company are J. D. Owens, C. A. Owens, M. C. McNeil, H. J. Barnhart, F. D. Glosser, W. A. Dorsey and E. J. Schoenlaub.

I.C.C. Hearings Open in Chicago, July 27

Investigation Into Bus and Truck Operations Will be Staged in 12 Cities

WASHINGTON, June 17—Assignment of dates and places where the Interstate Commerce Commission will conduct hearings in connection with its investigation of motor bus and motor truck operations and their competition with railroads was made this week by the commission. The hearings will open in Chicago on July 27 in the Great Northern Hotel, and will be held in twelve other cities throughout the country.

The schedule is as follows: Chicago, July 27; St. Paul, July 30, United States Court Rooms; Portland, Ore., August 7, Multnomah County Court Rooms; San Francisco, Calif., August 12, Room 237 Merchants Exchange; Los Angeles, Calif., August 17, California Railroad Commission; Denver, August 25, Public Utilities Commission; Detroit, September 1, Statler Hotel; Boston, Mass., September 8, United States Court Rooms; New York, September 10, Merchants Association Rooms, 233 Broadway; Asheville, N. C., September 15, Battery Park Hotel; Dallas, Texas, September 20, Jefferson Hotel; Kansas City, September 24, Chamber of Commerce, and Washington, D. C., September 29, in the office of the Commission.

It is announced by the Commission that the hearings will be as full as possible; that the railroads will constitute the first group to be heard; the operators of motor buses and motor trucks, the second group, and a third group of "all other interested parties."

See Ford Finance Change

NEW YORK, June 17—Newspapers here are carrying stories to the effect that Ford Motor Co. will soon announce a change in the financing of its time-payment sales to meet the competition

of lower terms available for other cars selling in the low priced fields. This change may take the form of a finance and insurance subsidiary inaugurated by the company itself under which lower interest rates would be available, or as an alternative to this, the company may enter an agreement with a group of present financing companies under which all Ford paper would be handled exclusively by these companies on a zoning basis at rates comparable with rates offered on competing cars.

S. A. E. Aeronautic Meeting Will Outline Progress

NEW YORK, June 17—Aircraft design, production and operation will be discussed at the first two-day aeronautic meeting of the Society of Automotive Engineers which will be held in Philadelphia, Sept. 2 and 3, just preceding the National Air Races, scheduled for Philadelphia, Sept. 4-11.

Commander E. E. Wilson, U. S. Navy, Bureau of Aeronautics and Dr. Adolph Rohrbach, of Berlin, will be among the chief speakers at the gathering. The former will talk on air-cooled engine development and the latter on economical and rapid production of all-metal airplanes and seaplanes. Commander Wilson's paper will be a part of the aircraft engine session which will open the meeting. Other speakers at that session will include E. T. Jones, Wright Aeronautical Corp., and G. J. Mead, Pratt & Whitney Aircraft Co.

At the air transport session an important speaker will be W. L. Smith, an air mail pilot who has flown the New York to Cleveland route ever since it was started. He will tell "How I Fly at Night." C. T. Ludington, B. B. T. Corp. of America and H. C. Ritchie, General Electric Co. will talk on illuminated air routes at the same session, while Lt. L. M. Wolfe, McCook Field, will discuss "Directional Radio in Flying."

The meeting will include an inspection trip to the Naval Aircraft Factory and a banquet. The committee in charge is: W. B. Stout, chairman; Paul Henderson, Glenn Martin, Ralph Upson, E. P. Warner and J. E. Whitbeck.

Kentucky Buys Kingham

LOUISVILLE, June 15—The Kentucky Wagon Mfg. Co. has taken over exclusive manufacturing rights to the Kingham trailers which have been made by the Kingham Trailer Co. of Wagoner, Okla. The line will hereafter be called the "Old Hickory-Kingham Trailer," to identify it with the Kentucky company's products. The entire Kingham organization will be affiliated with the Kentucky company in promoting the lines.

Flat-Rate Education Declared Vital Need

Speakers at Service Forum Cite
Advantages in Promoting
Owner Good-Will

DETROIT, June 17—Educating service station owners to the advantages of installing a flat-rate and piece-work plan of operation is one of the vital problems confronting automobile manufacturers today, speakers pointed out at the fourteenth annual factory service managers' forum of the National Automobile Chamber of Commerce, here this week. Relationship of the car owner and the automobile manufacturer, which has its point of contact at the retail establishment was the principle topic of the session.

Harry M. Jewett, president and general manager of the Paige-Detroit Motor Car Co., and Alfred H. Reeves, general manager of the N. A. C. C., emphasized the increasing importance of service as a medium of maintaining sales. Flat-rate and piece-work policies are not only business builders and profit makers, it was repeatedly declared, but in the long run are the most satisfactory methods of maintaining satisfied workers.

J. Howard Pile, United Motor Service, outlined policies which tend to drive the car owner from patronizing the service stations. Of the owners who change from one make of car to another, 50 per cent do so because of lure of varnish and 50 per cent because of shoddy treatment in service stations, it was declared.

Territorial meetings were discussed, both from the angle of holding them at the factory and in the field, and the tendency seemed to favor the latter as being conducive to obtaining better attendance and more satisfactory results. A. R. Sandt, of General Motors Corp. and F. A. Bonham, service manager, Durant Motors, Inc., both advocated that special sessions of territorial service meetings be thrown open to independent service station men and service station men of competitors pointing out that a large part of service work on any make of car is done in outside shops.

Discuss Certified Parts Sale

During the discussions on whether a policy should be adopted whereby automobile manufacturers would brand replacement parts as genuine or certified and package them, it was brought out the Willys-Overland Co. is adopting such a policy. "Certified parts for Overland fine motor cars" reads labels which this company is using on attractive orange and black cartons. Fast moving articles are being put up in cartons now, it was said, and the policy will be extended to other parts as soon as possible.

General Motors of Canada, Ltd., is franchising service stations for General Motors cars so that it will be possible for tourists traveling over main highways of the Dominion to obtain service

at least every ten miles along the route traveled, G. E. McTavish, general parts and service manager of General Motors of Canada, told the forum.

G. W. Brogan, of G. W. Brogan, Inc., advocated cooperation on the part of manufacturers with wholesalers to obtain assistance of jobber salesmen in equipping service stations with modern appliances.

High Offer Prompts Flint Plant Sale

FLINT, MICH., June 15—Notices have been sent to stockholders of the Flint Motor Co. by William C. Durant, president, that a meeting will be held July 1, to decide the future policy of the company relative to the sale of the factory here. While the company or corporation to whom the factory may be sold to, was not announced, Mr. Durant declared: "Regardless of reports to the contrary the Flint car is to be continued. Negotiations for the sale of the plant have progressed to such a point that in the opinion of the directors an advantageous sale can be made if the prompt approval of the stockholders is obtained."

The purpose of the sale is twofold, according to the announcement: First, to supply working capital necessary for a continuance of the business, and second, to provide a less expensive plant for the manufacture of the Flint line that is limited in volume by the present keen competition in this price class.

In confirming the notices, R. H. Mulch, vice-president and general manager of the Flint Motor Co., asserted that the offer that has been made for the factory is a very satisfactory one which only needs the approval of stockholders to complete the sale. The Flint factory comprises more than 1,000,000 sq. ft. of manufacturing space.

Though the name of the bidder is withheld, it is recalled that A. P. Sloan, Jr., president of General Motors Corp., declared at a recent testimonial dinner in Flint that General Motors had plans for a new activity in Flint the details of which would be announced later.

Cleveland Takes Over Manufacture of Bodies

CLEVELAND, June 16—Bodies for Cleveland cars are now being made by the company itself according to factory announcement. The new body department forms a wing of the main production plant, the bodies being built under progressive assembly methods. Capacity of the new body plant is sufficient for all present production requirements and is capable of augmentation as car output is increased. With the new body plant the car is now practically 100 per cent all-Cleveland built, the factory declares, insuring a definite standard of workmanship throughout. Furthermore it gives the company complete control of its production precluding any holdups due to delayed shipments from outside sources.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Co., second largest bank in America.

NEW YORK, June 17—The June crop report issued last week removed fear of a burdensome wheat surplus. Trade improved somewhat, particularly in the Southwest, upon betterment in cotton crop conditions and the beginning of what promises to be a good wheat harvest. The level of commodity prices advanced last week and the trend of stock prices was also slightly upward.

FREIGHT CAR LOADINGS

Car loadings continued to increase during the week ended May 29, with a total of 1,081,164, as against 1,039,385 in the preceding week and 913,087 in the corresponding period last year.

STEEL TONNAGE

Unfilled orders of the United States Steel Corporation at the end of May stood at 3,649,250 tons as against 3,867,976 tons a month earlier and 4,049,800 tons a year ago. The daily rate of steel ingot production last month was 151,744 tons, as compared with a daily rate of 158,613 in April and 132,883 in the corresponding period a year earlier.

FISHER'S INDEX

Fisher's index of wholesale commodity prices stood at 153.6 last week, as compared with 151.8 a week earlier and 152.3 four weeks earlier.

BANK DEBITS

Bank debits to individual accounts reported to the Federal Reserve Board for the week ended June 9 were 3.4 per cent above the total for the preceding week and 9.7 per cent above that of a year ago.

FEDERAL RESERVE STATEMENT

Bills and securities held by the Federal Reserve banks declined \$57,500,000 during the week ended June 9, with a decrease of \$76,800,000 in discounts partly offset by gains of \$5,700,000 in open market purchases and \$14,100,000 in Government securities. Deposits declined \$9,900,000 and note circulation \$11,200,000, while reserves increased \$36,000,000.

Call loan rates ranged from 3½ to 4 per cent last week, as against 3½ to 5 per cent a week earlier. Time loan rates were from 4 to 4½ per cent, with 60-day paper quoted at from 4 to 4½ per cent. This compares with a range of 4 to 4½ per cent for all maturities last week. Rates on commercial paper continued to be quoted at from 3½ to 4 per cent.

Loans of reporting member banks decreased \$57,000,000 during the week ended June 9. Loans secured by Government obligations and loans secured by stocks and bonds showed declines of \$5,000,000 and \$90,000,000, respectively, while "all other" loans increased \$38,000,000. Investments increased \$7,000,000, while borrowings from Federal Reserve banks decreased \$73,000,000 and net demand deposits \$4,000,000.

G.M.C. Retail Sales 503,014 in 5 Months

Sales by Divisions to Dealers
Total 524,707—Gains Ex-
ceed 50 Per Cent

NEW YORK, June 14—During the first five months this year retail sales by General Motors dealers were 503,014 cars, a new high level for the first five months of any preceding year, and comparing with 320,496 in the same period of 1925 and 315,084 in the 1924 period.

For the first five months this year sales to dealers by General Motors divisions were 524,707 cars, an excess of 21,693 over retail sales. Division sales to dealers in the 1925 period were 318,121, an excess of 3037 over retail sales, and the 320,115 sales to dealers in the 1924 period was an excess of 5031 over retail sales.

Retail sales in the five months' period this year gained 182,518 or 56 per cent over the 1925 period, while divisional sales to dealers gained 206,586 or 66 per cent.

May retail sales were 141,651 cars compared with 136,643 in April and 106,051 in March. Each of these months established new high monthly records.

Divisional sales to dealers in May were 120,979 cars against 122,742 in April and 113,341 in March this year, and against 77,223 in May last year.

Dealers Sales to Users			
	1926	1925	1924
Jan.	53,698	25,593	33,574
Feb.	64,971	39,579	50,007
Mar.	106,051	70,594	57,205
Apr.	136,643	97,242	89,583
May	141,651	87,488	84,715
	503,014	320,496	315,084

Divisions Sales to Dealers			
	1926	1925	1924
Jan.	76,332	30,642	61,398
Feb.	91,313	49,146	78,668
Mar.	113,341	75,527	75,484
Apr.	122,742	85,583	58,600
May	120,979	77,223	45,965
	524,707	318,121	320,115

These figures include passenger cars and trucks sold in the United States, Dominion of Canada and overseas by the Chevrolet, Pontiac, Oldsmobile, Oakland, Buick and Cadillac manufacturing divisions of General Motors.

Houde Adds Third Building

BUFFALO, June 14—Houde Engineering Corp. has begun work on a new administration building. The two-story brick and steel structure will have floor space of 14,000 square feet and will be the third building erected by the company in less than a year and a half. Increasing business made the addition necessary.

The company reports a 39 per cent increase in April over the same month last year. Production of Houdaille shock absorbers has been on full and overtime since March, 1925.

AC COMPANY BUILDS NEW SUPERCHARGER

FLINT, June 14—The AC Spark Plug Co. announces that it is developing a supercharger with which it expects that greater speeds will be obtained from the new 91½ in. racing engines. Working on this device for the AC company are F. N. Nutt, engineer in charge, and R. Cozette, a French engineer. Peter DePaolo, race driver, recently visited the AC factory to inspect the new supercharger.

Chevrolet U.S. Sales 250,927 in 5 Months

DETROIT, June 14—The Chevrolet Motor Co. sold 84,944 cars in May, setting a new monthly record. Of this number, 70,935 cars were sold in the United States. Sales increased 23,650 cars over May, 1925, when 47,285 Chevrolets were sold in the domestic market.

For the first five months of 1926, 250,927 cars were sold in this country alone, an increase in sales of 84,138 over the same period in 1925, when 166,789 cars were sold in the United States.

Dealer representation of the company has been increased by 2488 during the first five months of 1926. On June 1 dealers numbered 8398 of whom 5910 are in the United States.

At the present time sales are running at the rate of more than 18,000 weekly. The best weekly sales record prior to this year was the week of May 2, 1925, when 10,700 Chevrolets were retailed.

Domestic sales are taxing the production facilities of the company and the company would have been unable to fill this spring's orders had it not have been for the stock built up during the winter.

Hupp Business in May Reaches New High Mark

DETROIT, June 14—During May, the Hupp Motor Car Corp. enjoyed the largest volume of business of its entire history. Car shipments surpassed those for its largest previous month, March, by more than \$500,000. May 24 was the largest single day in the 18 years the company has been producing cars.

During the first five months of the year, Hupmobile shipments were 44 per cent higher than the corresponding period a year ago. May shipments were 89 per cent higher than the same month a year ago. On June 1, the company carried unfilled orders for \$2,800,000 worth of cars.

Rolls-Royce Moves Offices

NEW YORK, June 14—W. E. Hosac, vice-president in charge of sales, announces the removal of the Rolls-Royce executive offices from the Colonnade Building to the headquarters of Brewster & Co., Long Island City. Later, offices will be in the new General Motors Building.

April Tire Stocks Show General Rise

Production and Shipments
Show Sharp Recessions from
Earlier Months

NEW YORK, June 14—April inventories of high pressure inner tubes continued the climb begun last October, with both production and shipments falling off, but although balloon inner-tube inventories increased for the fifth consecutive month, production and shipments also rose, according to the Rubber Association of America, Inc.

High pressure inner tubes inventories rose from 4,742,309 in October to 11,628,673 in April, production declined from 3,814,617 in December to 2,293,701 in April, and shipments fell from 1,936,927 in March to 1,785,173 in April compared with 5,357,295 last July, the peak month.

Balloon inner tube inventories of 1,995,277 in December, were 3,241,677 in March and 3,875,828 in April. Production in April was 2,620,937 compared with 2,196,118 in March and shipments gained from 1,803,304 in March to 2,002,765 in April.

High pressure pneumatic casing April inventories were 5,187,115, the high month since January, 1923, production dropped from 1,840,268 in March to 1,597,394 in April, but shipments rose from 1,526,416 to 1,622,690.

Balloon casing inventories, production and shipments have been increasing each month this year. In April inventories were 2,831,328, production 2,111,056 and shipments 1,910,060.

Fabric pneumatic casing inventories rose from 1,217,416 in March to 1,327,251 in April, production dropped from 396,746 to 300,849 and shipments from 218,490 to 193,376.

Solid and cushion tire inventories and production both declined, the former from 218,991 to 214,115 and the latter from 57,218 to 49,401, while shipments rose from 37,369 to 51,025.

Based on April figures there were in May two months supply of high pressure inner tubes and 1.9 months supply of balloon inner tubes on hand.

Covering 75 per cent of the industry, the Association figures show crude rubber consumption falling from 45,497,208 lb. in March to 43,802,340 in April and cotton fabric consumption dropping from 14,197,612 to 13,929,340 lb.

Dealers Reduce Inventories

NEW YORK, June 16—Dealers are reducing their stocks of tires and tubes, according to the results of a survey covering dealers in 34 states and Canada, just completed by the National Tire Dealers Association.

Members reported approximately 10 per cent decrease on pneumatic tires as of April 1 over Jan. 1, 1926; tubes, approximately 10 per cent decrease and solid and cushion tires a little over 30 per cent decrease over the same period.

Congress Lays Over Bus-Truck Measures

Decision on California Carriers
Causes Opinion Present Ac-
tion Would be Unwise

WASHINGTON, June 17—The measures sponsored by the National Association of Railroad and Utilities Commissioners to bring interstate motorbus and truck traffic under the jurisdiction of State Commissions and the Interstate Commerce Commission will receive no further consideration at this session of Congress through an agreement reached here this week by the Senate and House committees on interstate commerce. The action followed the decision of the U. S. Supreme Court which declared the California Auto Stage and Truck Transportation Act unconstitutional.

Members of the Senate committee are understood to have held to the opinion that it would be unwise to act on legislation of this type at the present time and they looked upon the Supreme Court decision as proof of their theory.

When extensive hearings were held on this legislation it was found to have the vigorous opposition of many operators' associations. In view of the opposition developed before the Senate committee, the House body held no hearings, its members following the Senate hearings and concluding to let the matter rest.

Fisher Earns \$12,593,322 in Year's First Quarter

NEW YORK, June 12—Fisher Body Corp. and subsidiaries for the quarter ended March 31, reports net earnings of \$12,593,322 after expenses and depreciation. Net income after interest and Federal taxes was \$10,710,068, equal to \$4.45 a share on 2,400,000 shares of \$25 par stock.

Assets: Properties and plants after depreciation \$65,329,000; goodwill, etc., \$3,214,605; patents \$191,909; investments \$2,147,243; sinking fund for redemption of Fisher Body Ohio Co. preferred stock \$74,030; inventories \$21,312,932; accounts receivable \$22,991,770; notes receivable \$293,292; United States and Canadian bonds \$267,421; cash \$10,169,084; deferred charges \$1,264,450; unamortized cost of alteration to plants, equipment, etc., \$1,694,797; total \$128,949,633.

Liabilities: Common stock (par \$25) \$60,000,000; Fisher Body Ohio Co. preferred stock \$67,300; stock premium \$6730; Fisher Body common \$157,302; 5% gold notes \$12,500,000; General Motors Corp. advance account \$5,000,000; land contract payable \$500,000; accounts payable \$8,010,063; accrued payrolls \$2,413,183; accrued interest \$156,250; accrued liability insurance \$130,797; sundry accrued items \$895,227; Federal taxes, accrued and due \$4,762,155; reserve for contingencies \$2,073,617; surplus \$32,277,009; total \$128,949,633.

P. R. T. TO OPERATE DAILY PLANE LINE

PHILADELPHIA, June 15—An offer from Thomas E. Mitten, chairman of the executive committee of the Philadelphia Rapid Transit Co. to operate a daily passenger airplane service between Philadelphia and Washington has been accepted by Mayor Kendrick according to an announcement made yesterday. The service is to be put into operation early in July using three-engined Fokker monoplanes.

The Navy Yard flying field will be used as the Philadelphia terminal while a government field will be used at Washington. The actual technical operation of the line will be under the direction of Anthony H. G. Fokker.

The Fokker planes which are to be used will carry eight passengers and are similar to those used by Captain Wilkins and Lieutenant Commander Byrd in their Arctic expeditions. They will be equipped with Wright whirlwind engines.

Transport Council Meets in Chicago

CHICAGO, June 16—The initial meeting of the Mid-West Transportation Council consisting of representatives of the automotive industry, railroads, the electric railways, highway transport business and the public is in session today at the Hotel Morrison. The council has been organized in accordance with a resolution adopted at the Mid-West Transportation Conference held under the auspices of the National Automobile Chamber of Commerce in 1925.

The objects for calling the council together are "the coordination of all transportation agencies and to study legislation in states and municipalities in order that steam railroads, electric railways, and highway transport may function efficiently."

Members of the automotive industry on the council include Roy D. Chapin, chairman of the board, Hudson Motor Car Co., T. R. Dahl, vice-president of the White Company; Percy Owen, Dodge Brothers, Inc.; H. H. Rice, assistant to the president, General Motors Corp., and John A. Ritchie, president of the Yellow Truck & Coach Mfg. Co.

Standard Foundry Builds

RACINE, June 14—New construction costing \$200,000 will be undertaken at once by the Standard Foundry Co., a large producer of cylinder castings for the automotive industries in the Middle West. Plans are being completed for a brick and steel foundry building, 110 x 240 ft., adjacent to the present plant. Electric furnace equipment is planned. Arthur R. Janes is president and general manager.

Sheldon Sells Axle Business to Timken

Will Use Former Axle Plant for
Bumper Manufacture—
Continues Service

PHILADELPHIA, June 16—The Sheldon Axle & Spring Co., Wilkes-Barre, Pa., has sold its axle business, including good will and machinery, to the Timken-Detroit Axle Co., Detroit, but other lines made by the company will be expanded and merchandised aggressively. The Sheldon company will continue service on the axles previously sold.

The plant space hitherto used for axle production will be turned over to the manufacture of bumpers. The company has developed a new type of bumper featuring a rubber shock-absorbing element which is already original equipment on one of the largest selling lines of sixes. In addition to other original equipment business, Sheldon will soon announce the bumper for distribution through the wholesale and retail trade.

The Sheldon spring department, which has a record of half a century of operation, will be developed both for original equipment and the replacement market.

The Sheldon Axle & Spring Co. was formerly a subsidiary of the Spicer Mfg. Co., but was taken over a year ago by a group of Wilkes-Barre capitalists, including H. B. Schooley, president; G. M. Wall, vice-president; W. E. Lewis, S. T. Nicholson, P. F. O'Neill, W. T. Payne, H. J. Pritchard, G. W. Wilmot and W. H. Conyngham.

Senate Car-Theft Bill Has New Trial Features

WASHINGTON, June 16—Severe punishment for the transportation of a stolen automobile either interstate or foreign commerce is provided under the terms of a bill (S 1871) reintroduced in the Senate this week by Senator Cummins of Iowa. The measure was first introduced on Dec. 21, 1925, and is known as the National Property Theft Act. It would punish by a fine of \$5000, or by five years' imprisonment, or both, any person who transported a stolen automobile from one state to another. In order to make conviction as sure as possible the measure further provides that the thief might be punished in any state through which such property had been transported or discovered.

Hawdos Takes New Plant

CORNING, N. Y., June 14—The Hawdos Corp., is now occupying its new plant at Riverside, near here. The corporation manufactures the "Super Snub" automobile shock absorber and, because of a rapidly increasing business, found it necessary to purchase the more adequate structure in Riverside which was at one time the factory of the Corning Cut Glass Co.

Truck Owners Move to Meet I.C.C. Quest

Will Assemble Testimony and Make Plans for National Association

NEW YORK, June 15—Definite steps towards the organization of a national association to represent motor truck operators and shippers were taken at a meeting called by the Truck Users National Conference at New York this week. About 30 truck operators from various parts of the country accepted the report of the conference's activities in appearing at hearings on the Cummins bill for Federal regulation of trucks and buses. Theodore D. Pratt resigned as chairman and the conference resolved into a general discussion of the desirability of organizing a national body.

As a result of the opinion that such an association was much needed a committee of 10 was appointed to work out the plans and also to present the viewpoint of truck users at the hearings which the Interstate Commerce Commission is to conduct into the whole subject of truck and bus operation. This committee, which will hold its first meeting at the National Automobile Chamber of Commerce headquarters June 17, consists of:

Short haul operators, George W. Daniels, United States Trucking Corp., and George H. Pride, a private truck operator in New York; long haul operators, Buell G. Miller, president of the Philadelphia Motor Truck Association, and John Jacobs, of the Eagle Motor Haulage Co., New York; truck association secretaries, Theodore D. Pratt of the Motor Truck Association of America, and Thomas F. Barry, National Team and Truck Owners Association; shippers, W. J. L. Banham, Otis Elevator Co., and J. F. Atwater, traffic manager for the American Hardware Corp., New Britain, Conn.; N. A. C. C. representatives, D. C. Fenner of Mack Trucks, and W. B. Brearly of Autocar.

N. A. C. C. Committee Appointed

NEW YORK, June 15—The committee named by the National Automobile Chamber of Commerce to accumulate and present data relating to truck and bus operation, at the fall investigation by the Interstate Commerce Commission into motor transportation and its effect upon railroad operation, is composed of A. J. Brosseau, chairman; Windsor T. White, J. A. Ritchie, Alfred H. Swayne and Alexander Legge.

Rail Association Plans

Motor Transport Section

ATLANTIC CITY, June 15—Formation of a permanent motor transport section of the American Railway Association was undertaken at the annual divisional convention of the A. R. A. just closed. This action was taken following general discussion of motor transporta-

tion at a special meeting during which it developed that railroads were sustaining heavy passenger and freight losses due to bus and truck competition.

W. H. Lyford, vice-president of the Chicago & Eastern Illinois Line acted as temporary chairman of the motor transportation gathering and named a committee of 12 to plan the permanent body. This committee will report to the entire body of railroad men interested in the proposal to establish auxiliary motor lines, at a meeting during the summer at a place to be announced later.

British Growers Lose 33% of Rubber Trade

WASHINGTON, June 17—Full fruition of the eight months' economic warfare by the American government against the British rubber monopoly is now being enjoyed by the rubber users of this country, in the opinion of the U. S. Department of Commerce, in a statement this week summarizing the results.

"Great Britain simply succeeded in transferring its important rubber trade to the Dutch," the statement declares. "The British rubber monopoly has resulted in a decrease of approximately 33 per cent in the amount of crude rubber produced on British soil. In 1922, 75 per cent of the world's rubber was of British origin; now it is 50 per cent—attributable directly to the British rubber gouge."

Announcement is also made by the Department that the President of Bolivia has issued a supreme decree exempting owners of rubber forests who pay the special tax of one-half centavos per hectare on rubber land. This is done, it is explained, to encourage the development of Bolivian rubber forests and to take advantage of the American market.

First of New Overlands Driven Away by Dealers

TOLEDO, June 16—The climax of a convention of nearly 1000 Willys-Overland dealers, held at the factory here this week, came when 856 of the new light 4-cylinder models, to be introduced to the public about July 1, were driven away.

Each dealer drove away one car to prepare for the public announcement of the new model. Hoods were sealed. The new car has low lines, balloon tires, four-wheel brakes, and in power plant is the counterpart of many of the European light cars which develop high speed with low fuel consumption.

Adams Licenses Suspension

NEW HAVEN, June 15—Adams Springless Suspension Corp., Inc., is now offering to car manufacturers the right to use its springless suspension system under royalty arrangement. The company reports the closing of a non-exclusive license with one of the most important companies manufacturing in the higher priced field.

G.M.C. Will Increase Oshawa Operations

Plans are Announced to Bring Activities More Fully Under Drawback

OSHAWA, ONT., June 14—General Motors of Canada, Ltd., will proceed under the Canadian government's new tariff policy, R. S. McLaughlin, president, declares in a statement issued here, in which he sets forth future policies, which call for plant improvements and enlargements. A contract will be let within 10 days for a new factory 90 x 600 ft. which will be used exclusively for the assembly and manufacture of Pontiac cars in Canada.

Mr. McLaughlin's statement in part, setting forth future policies of General Motors in Canada, follows:

"A few weeks ago the Government introduced new tariff legislation adversely affecting the automobile business in Canada, which practically ruined General Motors of Canada, Ltd., and many other industries dependent upon it, but now, by reason of certain measures of relief that have been given, the situation looks more hopeful.

"Certain amendments have already been passed and it is hoped that the Government will see its way clear to go still further in modifying the effect of the tariff reductions. However, the changes already made, coupled with improved crop and business conditions, have encouraged this company to continue operations and in doing so, we have decided on a 'full steam ahead' policy, for a period of 12 months.

"But if the company is to continue operations in Canada on a sound and permanent basis, it is of the utmost importance that the volume of business be increased and that the greatest possible degree of efficiency throughout the plant and organization be attained, so that manufacturing costs can be reduced to a minimum. It is the intention of the company to try to accomplish these objectives during the next year in the hope that we will be able to overcome the handicaps.

Buick and Chevrolet Popular

"Not only have the well established makes of General Motors cars, such as McLaughlin-Buick and Chevrolet, been steadily increasing in popularity in the Canadian market, but the new Pontiac car, which was added to the line this year, has had a wonderful reception and will have to be taken care of as an important unit in General Motors production. Under the drawback arrangement, introduced by the government, it is necessary that Canadian made cars, in order to enjoy the benefit of this drawback, be at least 40 per cent Canadian product. This increase must be increased to 50 per cent by April 1, 1927. This, he said, would be taken care of by building the new unit for Pontiac manufacturing.

Congress Approves 1927-28 Road Bill

WASHINGTON, June 16—Enactment of the \$165,000,000 Federal aid road bill, through the affixing of the President's signature, is regarded as certain this or early next week, following the prompt passage of the measure by both the House and Senate. Final agreement between the House and Senate conferees was reached today and the bill completed its legislative journey through Congress when the House accepted the Senate's minor amendments to the measure. The bill now goes to the President for signature and his approval is certain.

The single amendment of consequence accepted in the Senate was offered by Senator Reed of Pennsylvania. It provides that the Secretary of Agriculture shall work out a plan to plant trees along the main highways. The work would be done in cooperation with the States.

Under the terms of the bill the program of 50-50 contributions by the National government and the States in road building expenses will be carried. More than 66,000 miles of the 200,000 miles included in the system already have been initially improved. A \$75,000,000 appropriation to continue the work for the fiscal year, beginning July 1, 1926, already has been made by Congress.

Spain Fixes Luxury Tax

WASHINGTON, June 17—Effective July 1, Spain will impose a luxury tax of not more than 5 per cent ad valorem on imports, Trade Commissioner M. D. Hester at Madrid advises the Automotive Division of the Department of Commerce. The tax will be collected at the time import duties are paid. Included in the list are "new or luxurious automobiles and touring cars having up to 8 seats," priced from 10,000 pesetas for bodies and from 100 pesetas for accessories.

The dispatch states that American

automotive manufacturers and Spanish automobile importers are privileged to make objections to motor cars being placed on this list if the objections are filed within 15 days following publication of the official decree.

Hudson Report Shows \$28,123,471 Surplus

DETROIT, June 15—Hudson Motor Car Co. consolidated balance sheet as of Feb. 28 shows total assets of \$64,290,841 and a profit and loss surplus of \$28,123,471. The following items are included:

Assets—Cash, \$2,370,539; United States Treasury notes and Liberty bonds, \$11,000,000; sight drafts, \$7,384,696; accounts receivable, \$1,130,195; inventories (at cost or market whichever lower), \$19,601,769; investments, \$39,610; plant, equipment, etc., after depreciation, \$21,822,898; deferred expenses, \$941,133; total, \$64,290,841.

Liabilities—Accounts payable, \$13,644,875; taxes, pay rolls and sundries accrued, \$1,954,669; dividend payable April 1, 1926, \$997,912; reserve for Federal taxes payable 1926-1927, \$2,610,028; reserves for contingencies, \$333,261; capital stock (represented by 1,330,050 no par shares), \$16,626,625; capital stock 100 shares at \$10 par, \$1000; surplus, \$28,123,471; total \$64,290,841.

Canada Opens Hearings on New Tariff Provisions

WASHINGTON, June 17—Assistant Trade Commissioner T. R. Wilson at Ottawa cables the Department of Commerce that the Canadian Tariff Advisory Board has begun to hold public hearings on applications for changes in the duties and drawbacks caused by the recent tariff changes, which had a material affect on the American-Canadian automotive production.

Automotive interests in the United States are instructed by Commissioner Wilson to address their communications to M. B. McKinnon, secretary of the board.

Walden-Worcester and Stevens Merge

NEW YORK, June 15—Directors of both concerns have approved the plan to consolidate Walden-Worcester, Inc., of Worcester, Mass., and Stevens & Co. of New York, manufacturers of shop equipment, under the name Stevens Walden-Worcester Co. Announcement is being made to stockholders and the merger becomes effective July 1.

J. V. Critchley, president of Walden-Worcester, will become president of the new company in charge of production, while Louis Schwab of Stevens & Co. will be vice-president in charge of sales. Mr. Critchley has been active in various large enterprises in New England and is also president of Reed-Prentice Co., manufacturer of machine tools and chairman of the board of Graton & Knight Co. Mr. Schwab has been an outstanding factor in trade activities and is one of the pioneers in the shop equipment field.

Stevens & Co. was established in 1899 and has been associated with the automotive industry since its beginning. In 1920, Louis Schwab began the extensive development of Stevens Speed-Up Tools. By combining these two standard lines under enlarged facilities, it is expected that substantial advantages will result in production and selling.

Both companies have adhered to clean-cut policies of distribution, which will be maintained. No changes are likely in the sales personnel, and the intensive sales work planned for the combined lines in more limited territories will probably require an increased sales force.

The executive offices of the new company will be centralized at Worcester.

Yellow Truck Net Lower

CHICAGO, June 15—Yellow Truck & Coach Mfg. Co. reports net income for the first quarter of the year as \$580,466 as compared with \$733,570 in the previous quarter. Chicago Yellow Cab Co. reports income as \$555,375, comparing with \$615,853 in the same quarter 1925.

Developments of the Week in Leading Motor Stocks

NEW YORK, June 17—General Motors continued its advance to new high levels on the movement above 140 this week, thereby selling within 10 points of the highest price at which the present stock has ever sold. While Durant, Schwab and Whelan, understood to be working together on the constructive side of the Stock Market were credited with heavy buying of this issue during the early stages of its advance, thus starting the movement, optimistic reports on the current state of the company's business brought in a large following, making it the most active stock on the list as well as the most active issue in the motor group.

It might have been expected that under such impressive leadership, other

motor stocks would have shown corresponding strength but a review of the week's price changes shows little evidence of sympathetic buoyancy. Chrysler around 33, Dodge Brothers A around 26½, Hudson around 67 and Willys-Overland around 27 were within a point or two of former levels. If the action of the group as a whole is considered, there is little indication of any change in the general trend notwithstanding General Motors outstanding performance.

Although Ford Motor Co. has not given the financial community any vehicle through which to express its speculative opinions on the outlook for this company, there is nevertheless considerable apprehension in trading circles as to what the next move from this quar-

ter will be and its bearing on the immediate prospects of other companies.

Changes in models by other manufacturers are also in the financial air. Talk of impending price cuts has been stimulated by the Hudson reduction, but barring some minor readjustments here and there no marked downward revisions are expected.

Securities of the truck manufacturers continued to show a firm tone with Mack Trucks advancing above 117 and White Motors above 57. Yellow Truck & Coach also reached new high ground on the move above 26 notwithstanding a disappointing report on earnings for the first quarter of the year.

Tire and accessory stocks showed little change during the week.—E. S.

Metal Buying Shows More Active Demand

Industry Branches Place Increased Orders for Lead, Copper and Zinc

NEW YORK, June 17—Although there has been very little change in the scope and character of steel demand, market sentiment is decidedly more cheerful. Largely responsible for this is Wall Street. Ordinarily the steel market pays little heed to the antics of the stock market, but gloom had settled so thick over the steel industry at the beginning of the month that, when Wall Street sent the stock of the leading producer and that of the leading automotive consumer back to near the year's high records, it came as a gleam of sunshine.

Lead, for many months in the doldrums and under pressure in spite of on the whole not overlarge supplies, turned the corner amid a scramble among consumers to buy. Copper and zinc also made a better showing. Improved demand for lead indicates greater needs by storage battery makers as well as for bearing metals, and these telltales can be rightly construed as forerunners of better steel demand.

Better sentiment in the steel market at this time is hardly likely to have any pronounced effect on prices. Attempts on the part of producers to raise the price of steel bars to the 2 cent level involved greater effort than was thought necessary, and there are still believed to be sellers at 1.90 cents. In some specialties, however, price recessions seem to have reached a point from which a moderate rebound would not come as a surprise.

Certain it is that full-finished automobile sheets are selling at present entirely out of gear with the prevailing quotation for the semi-finished material, and third-quarter negotiations for sheet bars are being closely watched as a possible indication to the market's trend. Non-integrated sheet-rollers are bringing pressure to bear to secure lower sheet bar prices so as to be able to make both ends meet in the present market for their finished product.

Pig Iron—Somewhat more active demand by automotive foundries is in evidence, and a fair quota of bona fide inquiries for third-quarter shipments is reported by furnace representatives.

Aluminum—Importers as well as the domestic producer look for increased demand from the automotive industries as the result of the planned manufacture of "light cars." Displacement of aluminum in some of the parts of 1926 models is said to be a one-season affair, and aluminum will again be used in the 1927 models. Remelted and scrap aluminum are a shade easier due to slacker inquiry by Detroit and Cleveland parts foundries.

Copper—Following better sales than in some time, some producers are now

asking 14 cents, delivered to Connecticut fabricators.

Tin—The market has turned stronger, and the bulls are again in command on the London Metal Exchange.

Lead—Successive price advances have quickened the demand from storage battery makers. A few weeks ago no one wanted lead; today there is hardly a consumer who is not in the market.

Zinc—Firm and higher.

May Rubber Imports Show Price of 55.47

WASHINGTON, June 17—Preliminary statistics on crude rubber imports in May show that the import price fell to 55.47 cents per pound, it is announced here by E. G. Holt, chief of the rubber division of the Department of Commerce.

Returns in hand from customs authorities at the ports of New York and Boston, where 96 per cent of the total tonnage of rubber imported into the United States has entered during recent months, indicates that May imports of crude rubber and liquid latex were 29,724 long tons valued at \$36,930,000.

Imports of guayule, jelutong, balata, gutta percha and other crude, scrap and reclaimed rubber are not included in this tonnage.

February was the peak month for rubber import prices. During February the average price per pound was 79.78 cents per pound. In March the price was 74.76 cents and in April 62.99 cents. In May, 1925, the import price was 36.6 cents per pound.

Rubber Prices Firmer

NEW YORK, June 14—There was a gradual improvement in prices on the New York Rubber Exchange last week, although trading was rather on the quiet side. Improvement in price can be attributed to short-covering, with a little better inquiry from manufacturers.

The market continues in a hesitant manner, probably due to the absence of any sustained trade buying, as well as the uncertainty of the statistical outlook for the next few months.

London stock is slowly increasing to healthful proportions and amounted to 20,882 tons the beginning of last week.

U. S. in Road Congress

WASHINGTON, June 12—Participation by the United States, as an active and permanent member in the Permanent Association of the International Road Congress, was authorized this week by Congress. The next session of the Congress will be held in Milan, Italy, Sept. 6-12 inclusive. Approximately twenty official delegates from the U. S. will represent the automobile and road building industries.

The last session of the Congress was held in Seville, Spain, three years ago. By virtue of the fact that the United States is now a member the next meeting to be held in 1928 or 1929, it is expected, will be held in this country.

Financial Notes

Studebaker Corp. of America—A. R. Erskine, president, says that profits for the second quarter will be better than in the first three months of the year, when \$2.08 a share was earned on the common stock after all charges except preferred stock sinking fund. "Business generally is on the upgrade and I am optimistic for the future," he said. "My own opinion is that the last half of 1926 will be better than the first half, and that includes the automobile industry as well as other lines of trade."

Auburn Automobile Co. directors at the regular quarterly meeting increased the regular dividend from 75 cents to \$1 and declared an extra dividend of 10 per cent in stock. The cash dividend is payable July 2 to stock of record June 22 and the stock dividend is payable in halves on Aug. 2.

General Motors Corp. reports total number of common and preferred stock holders for the second quarter of 1926 as 53,097, compared with 54,851 for the first quarter of 1926 and with 50,917 in the final quarter of 1926.

Norwalk Tire & Rubber Co. declared a dividend of 25 cents on the common stock, compared with previous quarterly rate of 40 cents, also the regular quarterly dividend of \$1.75 on the preferred. Both dividends are payable July 1 to stock of record June 20.

Pratt & Lambert, Inc., directors have declared the regular quarterly dividend of 75 cents and also an extra dividend of \$1 a share on the no par common stock, all to be paid July 1 to stock of record June 15.

Jordan Motor Car Co.—Regular quarterly dividends of 75 cents on the common and 1½ per cent on the preferred have been declared, both payable June 30 to stock of record June 21.

Chandler-Cleveland Motors Corp. has declared regular quarterly dividend of \$1 on the preference stock, payable July 1 to stock of record June 21.

Murray Body Corp. preliminary statement for the four months ended April 30, 1926, shows profit of \$750,000 after depreciation and all charges but before federal taxes.

Goodyear Tire & Rubber Co. of Canada, Ltd., declared regular quarterly dividend of 1½ per cent on preferred, payable July 20.

Wright Sales Exceed 1925

NEW YORK, June 14—During the first five months this year the Wright Aeronautical Corp. delivered 75 engines solely for commercial use, compared with 63 during all of 1925 and 21 in all years up to Jan. 1, 1925. More than 40 per cent of sales this year have been in commercial units. While the airplane and airplane engine industry is still largely dependent on the government for the bulk of its business, developments during the past year have greatly stimulated the use of commercial aircraft. This has been due largely to the record established by the Post Office Department air mail service.

Marmon Head Finds Small Cars Nearing

Industry Should Guard Against
Extremes Says Williams—
Big Car Always Factor

INDIANAPOLIS, June 14—Commenting on the trend to smaller cars based upon European engineering principles, and the consideration which Marmon Motor Car Co. is giving it, W. G. Williams, president, said that Marmon is fully alert to the developments and is prepared to meet any demand which may arise from its clientele for a smaller car. This, however, would be a supplemental car to the present type of large car, which he says, is indispensable to the family of means. Mr. Williams said in part:

"For the last ten years every serious-minded student of automobile development has recognized that constantly thickening traffic conditions, particularly in congested metropolitan centers, would sooner or later compel all manufacturers to give increasing attention to small car production. The stronger and more progressive factories have been unquestionably awake to the tendency of the time and have spent much time and money trying to interpolate European swank and style with sound American engineering practice.

"I regard it as highly important that the industry guard against being swept into extreme measures by all this small car agitation, bearing in mind always that the big, luxurious car has become an inherent part of our transportation system, and utterly indispensable to the type of family of means which loves to go places and do things. So far as Marmon is concerned, we have become, during the course of years, so inseparably identified with this large car field that nothing could induce us to even consider departing from it or in any way temporizing with our present large car program.

Have Studied European Cars

"However, it is a fact that Marmon engineers and executives have recently spent much time abroad, making an exhaustive study of the engineering phases of European motor cars, which have found such favor with Americans of means and discrimination. Concurrently, our engineers have considered the possibility of adapting European engine practice to American manufacture, arriving at the conclusion that the low engine powers prevailing in Europe would be distasteful to the impetuous and more dynamic American temperament.

"It seems that the logical solution is a combination of the best elements of European body design with tried American engine practice. Unquestionably, this country is realizing the necessity for a small, beautiful, high-powered type of car that will go far toward at least

temporarily relieving our traffic congestion and solving the parking problem. Beauty, speed, safety and power in miniature seem to be the next call in prospect for the American manufacturer.

"If this small car discussion is tending to focus itself on Marmon, we have no means of preventing it, although I am quite sure that other manufacturers are giving as much thought to the matter as are we ourselves.

"I have only this to say—we have been very alert to this small car tendency for over two years, and if we should at any time believe it expedient or incumbent on us, in consideration of the Marmon clientele, to produce a smaller second car, we are completely prepared, and such a car would be strictly supplemental to the big car on which Marmon reputation has been laboriously built up over a long period of years. In the event of such collateral production we would seriously attempt to make any small car that bore the Marmon name the most unusual and interesting of its kind in the world."

Miller Racing Cars Sweep Altoona Flag Day Event

ALTOONA, PA., June 14—Dave Lewis, who has followed the racing game since back in the 90's and the oldest driver on American tracks today, was the winner of the third annual Flag Day and the sixth automobile championship event over the Altoona Speedway mile and one-quarter board track.

Lewis piloted a Miller front-drive model and covered the 250-mile course in 2 hours, 13 minutes and 24.61 seconds. He won only by a scant margin over Norman Batten of Brooklyn, who finished in 2 hours, 13 minutes and 28.11 seconds. Batten drove a Miller special.

Capt. John F. Duff of London, England, piloted a Miller special to third place. Fred Comer, with a Miller special, came in fourth. The others finished in the following order: Eddie Hearne, Locomobile Jr. 8; Bennet Hill, Miller special; Frank Elliot, Miller special; Pete DePaolo, Miller special; Bob McDonogh, driving for Ralph Hepburn, Miller special; Ben Jones, Abell special.

Milwaukee Casting Builds

MILWAUKEE, June 14—The Milwaukee Die Casting Co., widely known in the automotive industries for bearings and other die cast products, is building an addition to its production area to handle its growing business. Some time ago an adjoining building was acquired to effect a material increase in capacity.

Ace Manufacture Changed

PHILADELPHIA, June 14—Ace motorcycles, which were formerly manufactured by the Blossburg Corp. at Blossburg, Pa., are now being manufactured by the Michigan Motors Corp., of Detroit. This new corporation is a subsidiary of the Blossburg company and its plant in Detroit is the one formerly owned by Turner & Moore.

New Merger Forms General Equipment

Forest Electric, Dearborn
Equipment, Hempy-Cooper
and Allen Electric Merge

NEW YORK, June 14—With the announcement of the resignation of Martin Goldman from the vice-presidency and general managership of the Forest Electric Co., of Newark, N. J., comes the news of an important merger of four large automotive service shop equipment manufacturers into the newly organized General Equipment Corp., chartered under the laws of Michigan. Mr. Goldman becomes the merchandising sales director of the new corporation.

The companies in the merger are the Forest Electric Co., maker of battery chargers, testing instruments, etc.; Dearborn Equipment Co., of Kalamazoo, repair shop labor-saving tools; Hempy-Cooper Co., of Kansas City, rebabbitting equipment, and the Allen Electric Co., of Detroit, electrical testing equipment.

The general offices of the new corporation will be located in Kalamazoo and manufacturing operations will be consolidated there in the plant of the Dearborn Equipment Co. and in a new factory building which will be erected.

The plant of the Allen Electric Co., at Detroit, will be used as an engineering laboratory, and the Hempy-Cooper and Forest plants will be closed.

The executive personnel of the new corporation will be made up principally of the officers of the merged companies.

Supreme Court to Decide Car Confiscation Powers

WASHINGTON, June 16—The question as to whether or not prohibition officials may seize an automobile carrying liquor and sell same ignoring a duly recorded lien held by the agent, dealer, or investment company is to be adjudicated by the United States Supreme Court. The court this week ordered restored to the docket for argument next term the case of the United States vs. the Port Gardner Investment Co. of St. Louis, Mo., a case involving the rights of sellers of automobiles which have later been seized by officers.

The precise question involved is whether section 3450 of the Revised Statutes has been repealed or superseded by section 26 of Title 2 of the National Prohibition Act so as to preclude the government from availing itself of the provisions of section 3450 which provides for the forfeiture of vehicles carrying liquor with intent to deprive the Government of tax thereon.

Paige Shipments Increase

DETROIT, June 14—May shipments by Paige-Detroit Motor Car Co., totaled 4909, a gain of 6 per cent over April. June production schedules call for an increase over May.

Men of the Industry and What They Are Doing

Noted Metals Authority Heads A.O. Smith Research

T. McLean Jasper, formerly a member of the University of Illinois faculty, has been appointed director of research by the A. O. Smith Corp. Professor Jasper is a recognized authority on "fatigue of metals" and for the past five years has had charge of that branch of research at the university's laboratories.

His contributions in this field include papers on the fatigue of metals, Maximum Energy Theory of the Failure of Metals, Shrinkage Strains in Rolled Metals, Theory of the Change in Modulus of Elasticity with Temperature Changes, Accurate Determination of Poissons' Ratio in Metals and the Testing of Metals at Elevated Temperature. These papers have been presented before the leading engineering societies of America and England.

B. & D. Executives Abroad

S. Duncan Black, president of the Black & Decker Mfg. Co.; W. C. Allen, sales supervisor; E. D. Allmendinger, export manager, and their families, are now in Europe. They will spend several days in London at the offices of Black & Decker, Ltd., and then proceed to Paris, Rome, Milan, Turin, Zurich, Vienna, Prague, Berlin, Amsterdam, Brussels and back to London, where they will sail for this country on Aug. 10. They will visit every Black & Decker distributor in these cities and will also call on the large plants equipped with Black & Decker tools.

Lindahl With Holley

R. W. Lindahl has been appointed sales manager for Holley Carburetor Co., in charge of the eastern district of the United States. He will maintain headquarters in New York City, and will have charge of sales in Maine, New Hampshire, Vermont, New York, Massachusetts, Rhode Island, Connecticut, Delaware, New Jersey, Pennsylvania and Maryland.

Leonard Makes Coast Trip

H. J. Leonard is on his first trip to the Pacific Coast since his appointment as president of the F. B. Stearns Co., manufacturers of Stearns-Knight cars. He is making a general survey of his distributor connections throughout the west.

N. S. P. A. Elects Members

DETROIT, June 15—Directors of the National Standard Parts Association have ratified the admission of the following manufacturers to membership in the association: Brandt-Warner Mfg. Co., J. A. Drake & Sons, W. D. Foreman, Multibestos Co., Perfection Gear Co., Wilkening Mfg. Co., Security Mfg. Co., Rotter Boring Bar Co. and Wisconsin Machinery & Mfg. Co.

BUICK SALES CHIEF STARTS 11th YEAR

E. T. Strong, general sales manager of the Buick Motor Co., on June 1, entered on the eleventh year as sales chief for the Buick organization.

During the 10 years that Mr. Strong has been sales manager of the company, it has enjoyed the record of being awarded first choice of space at the national automobile shows for the last eight successive years.

Mr. Strong hails from Imlay City, Mich., and, his first job was setting up farm implements for the McCormick Harvester Co. He joined Buick Motor Co. as a special traveller and after much success as a branch organizer he was appointed general sales manager in June, 1916.

A total of 1,360,259 Buick automobiles have been sold since he became Buick sales manager, or 84 per cent of all Buicks sold since the company's founding.

Chrysler Finds Times Good

Walter P. Chrysler has issued a statement saying that American business should face the second six months of 1926 with confidence. Times are good, he said, and they will continue to be good. There is no sound economic reason for any change in business conditions at the present time. He points out that though everyone is not satisfied with the volume of business or its profitability, there never was a time when everyone was satisfied.

Corey Resigns From Bowser

D. A. Corey, vice-president of the S. F. Bowser Co., manufacturers of gasoline and oil tanks and pumps, has resigned and will devote his time to travel. He has been actively connected with the company for 22 years, starting as a salesman in the Boston territory. He recently returned from Havana.

Dunlop Adds 4000 Daily

BUFFALO, June 16—Production of passenger tire casings in the plant of the Dunlop Tire & Rubber Corp. here has been increased from 6000 to 10,000 daily through the opening of a new unit equipped to manufacture the additional 4000 casings. E. S. Germain, president of the company, said the 4000 casings and tubes per day increase represents production progress that is fully two years in advance of plans outlined by the plant when it opened in 1923. The Dunlop plant is designed for an ultimate peak daily capacity of 25,000 casings and tubes.

20 Engineering Graduates to Train at Olds Plant

The Olds Motor Works will open its doors, this summer, to 20 college graduates with the idea of training them for future executive positions, in the expanding Oldsmobile organization.

Letters were sent to the deans of the college of engineering in seven universities, this spring, outlining the Oldsmobile plan. E. E. Eby, assistant to I. J. Reuter, president and general manager, later visited the universities and personally interviewed senior students who desired a career in the automotive industry. Those filling the preliminary requirements were brought to the Oldsmobile plant where they were interviewed by executives and some of their number selected.

By the plan, the graduates will work under the direction and close supervision of the personnel department. They will be routed through the organization to determine their individual talents. Those displaying an aptitude for sales and service work will be given different routing than those whose talents tend toward engineering and production.

Roberts With Star Rubber

A. O. Roberts has been appointed manager of advertising and sales promotion by the Star Rubber Co., Akron. He has been closely identified with the automotive industry for a number of years in advertising and sales capacities. At one time he was associated with the Maxwell, Chalmers, Chrysler companies, later becoming assistant advertising manager of Velie Motors Corp. He then entered the advertising department of the Miller Rubber Co. as editor of the Tire Trade News.

Koll Visits Distributors

Orlando J. Koll, president and general manager of the Latex Tire & Rubber Co., has returned to his offices at the main factory in Fond du Lac, Wis., after a motor trip of 2666 miles visiting Latex distributors. Nathan Haessly, a member of the executive committee, accompanied Mr. Koll to study conditions.

Konecky Fyrac Sales Head

Max Konecky has been appointed sales manager of the Fyrac division of the National Lock Co. He has been Chicago district manager for Fyrac and is credited with remarkable success in this territory.

Pierce-Arrow Gains 31%

BUFFALO, June 15—Pierce-Arrow Motor Car Co. reports total shipments of passenger cars, trucks and buses for the first five months of this year showed an increase of 31 per cent as contrasted with the same period of 1925. May sales showed a substantial gain over May of last year.

Labor Difficulties Check French Output

Renault and Farman Plants
Closed Temporarily—Will
Use Outside Factories

PARIS, June 3 (*by mail*)—Fire destroyed one of the buildings of the Renault factory, covering an area of 860,000 sq. ft. and caused damage estimated at \$400,000. The building was used as store room for tires and magnetos. Coming immediately after a strike involving 25,000 hands, it was at first believed that the fire was due to action of the workers, but closer examination leads to the opinion that it was entirely accidental.

The Renault factory has been entirely closed for two weeks owing to labor disputes which originated in the body building department. After locking out the entire factory, Renault took back the hands individually, at an increase of 10 per cent, but refused to admit the strike leaders. Owing to the shortage of labor in France, large numbers of men are foreigners, including Poles, Russians, Roumanians, Algerians, and Chinese. Possessing a factory at Le Mans, 120 miles west of Paris, it is understood that Renault intends to make use of it for the production of one of his cheap models, believing that this district will be less affected by labor difficulties than the Paris region.

The Farman automobile and aviation factory, only a few hundred yards from the Renault works, has been almost entirely closed during the last two weeks by reason of labor troubles.

French War Board Seeks Truck Using Gas Producer

PARIS, June 4 (*by mail*)—Believing that automobile trucks burning gas produced from wood, charcoal or coal are now a practical proposition, the French Army is prepared to include them in its truck subsidy scheme. Beginning on April 1, 1927, the War Department will hold a public competition for 3½ and 5-ton trucks using gas producers and will give the makers of the successful types the right to offer these to the public as subsidized models.

Competitions held in France during the last two or three years have proved that charcoal gas can now be produced which is in every respect as clean burning as that obtained from liquid gasoline. The results obtained in this direction by Panhard-Levassor with their own gas producer and the Knight engine are particularly remarkable. By offering subsidies it is hoped to extend the use of gas producer trucks among civilians, thus giving the Army a fleet on which it can draw in time of national danger. The French military regulations impose only minor technical restrictions and standards, dealing with the interchangeability of such parts as wheels, tires, magnetos, etc.

GERMAN RAIL LINES STUDY SHORT HAULS

NEW YORK, June 11—Adoption of motor truck and motor bus transport is under consideration by German railroads, according to Herr Geheimrat Otto Kopeke of Dresden, Germany, who has just arrived home after a month's tour of the United States. With the assistance of the National Automobile Chamber of Commerce, Mr. Kopeke made a special study of the operation of motor units by leading U. S. railroads in handling their short haul business. Mr. Kopeke is chairman of the board of directors of the Saxon Public Traffic Corp. and made his American trip as an official delegate from the Saxon government.

Majority of Fuel Dopes Worthless, Says Bureau

WASHINGTON, June 14—As the result of a large number of tests, made at the instance of motorists and automobile manufacturers, of the so-called "fuel dopes" for gasoline, it has been announced here by the U. S. Bureau of Standards that in the majority of cases the "dopes" are worthless.

Scientists at the Bureau, after subjecting these concoctions to tests declare that they have been unable thus far to determine where any appreciable improvement in power of fuel consumption is derived.

The Bureau characterizes as "unfounded and worthless" the allegations by manufacturers of many of these fuel dopes that their products make for fuel economy. Actual tests have disclosed, the Bureau asserts, that the gain these manufacturers attribute to their product, merely results from adjusting the carburetor to their leaner mixtures of gasoline, in compliance with the instructions given by the manufacturers.

It is made clear, however, that mixed commercial gasoline sold by reputable dealers does not contain these worthless elements, but actually do contain ingredients beneficial to operation.

Highway Completes Plant

EDGERTON, WIS., June 14—Highway Trailer Co. has rounded out the work of making its product entirely manufactured at its factories here by building a new molding section in which this work is done for the most part by machine. Only bearings and rubber materials remain unmanufactured by the company itself.

Kearney & Trecker Builds

MILWAUKEE, June 14—The Kearney & Trecker Corp., maker of Milwaukee milling machines and other machine shop equipment, is adding a third story to one of its buildings at Fifty-ninth and National Avenues.

New Duty to Replace Mexican Sales Tax

Increases Range From 2½ to
10 Per Cent According to
Price Classes of Cars

MONTEREY, MEXICO, June 14—Widespread protest against the 10 per cent sales tax imposed on automobiles and accessories by the Mexican Government has resulted in a statement by the Minister of Finance that a decree will be issued immediately by President Calles, abrogating the tax. In lieu of the sales tax the import duties on automobiles and accessories are to be divided into three classes. Automobiles valued at \$1000 and under, manufacturers price, will pay an additional import duty of 2½ per cent, those valued at \$1000 to \$1650 will pay 5 per cent import tax and those above this valuation will pay 10 per cent tax.

Thus the cheaper cars gain considerably by the new decree, while the high priced cars are not let down so easily. The additional tax to be imposed is based on the manufacturers price and not on the sale price asked by the local dealers. An import duty of 10 per cent already exists on all automobiles and the new duties will be additional to this amount.

Although the sales tax was in effect but a short time, it caused a big decrease in the automobile and accessory business, it is stated.

"No Signs of Let Up" Says Plate Glass Head

MILWAUKEE, June 14—"There has been a lot of talk lately about a slump in the automotive and construction industries; all I can say is that automobile manufacturers and builders have ordered more glass from us so far this year than ever before and from orders on hand at the moment there are no signs of a let-up," said Captain Charles W. Brown, president, Pittsburgh Plate Glass Co., while here to attend an advertising conference at the Milwaukee paint and varnish works of his company.

Captain Brown also expressed the thought that business might be called somewhat spotty, but on the whole it is very good. "As a nation we grow uneasy very readily—perhaps to readily," he said. "To my mind the answer to whether we are having good business or not lies in the employment situation, and all of us know there is no unemployment to speak of anywhere in the United States."

Makes Axle at Moline

PHILADELPHIA, June 14—Manufacture of axles for Velie cars has always been carried out by the Velie Motors Corp. at its Moline plants. It was inadvertently stated that this manufacture had recently been transferred from Marion, Ind.

Detonation Stopped by New Piston Type

PARIS, June 3 (*by mail*)—Detonation can be eliminated by physical means, without the use of chemicals, according to the statement of M. Rateau before the French Academy of Sciences. The process, which has been originated by M. Dumanois, marine engineer at present attached to the National Office of Liquid Fuels, consists in the use of a piston of such a shape that the explosive waves are broken up. The piston presented to the Academy has a special type of head forming a series of steps, the use of which, it is claimed, has entirely eliminated all tendency towards detonation.

These pistons were used on an engine operating with 77 per cent gasoline and 23 per cent kerosene, and the results obtained were similar to those of a normal engine running on straight gasoline and lead tetraethyl, namely a road speed of 61 miles an hour and a gas consumption equal to 21 miles to the American gallon.

Renold Assumes Sales

NEW YORK, June 14—Renold silent timing chains, heretofore marketed directly, are now being marketed direct to the jobbing trade by the maker, Hans Renold, Inc., 365 Broadway. W. F. Meyer has been placed in charge of distribution in the timing chain division.

Coal Truck Sales Gain

NEW YORK, June 14—Autocar Co. for the first quarter shows an increase of 85 per cent in sales of coal trucks over the first quarter last year. Practically all these sales have been made since the settlement of the coal strike.

Coming Feature Issue of Chilton Class Journal Publication

Sept. 30—Automotive Industries
Annual Production Issue

Dunlop Rubber Reissues Cotton Subsidiary Stock

LONDON, June 4 (*by mail*)—An offer of £2,250,000 6½ per cent cumulative preference shares of No. 2 D. R. Cotton Mills Co., is to be made here next week. This company is a subsidiary of the Dunlop Rubber Co., which guarantees the dividend on the preference shares. The 20 shilling shares will be offered at 21s. each. The prospectus will show that after deducting all liabilities, including creditors, there are £14,000,000 of assets to support the guarantee.

One-and-a-half million of these preference shares have been in existence since 1920, and until a year ago were in the possession of outside interests. The Dunlop company, considering it would be of advantage to hold these shares, bought them, and are now re-issuing them at a lower rate of interest. The cotton mills are among the largest in the world.

Atlas Metal Parts Builds

MILWAUKEE, June 14—The Atlas Metal Parts Co. has awarded contracts for the erection of a new and larger plant which with equipment will cost about \$50,000. A large share of the business is attributable to the automotive industries, requirements of which are the heaviest ever experienced.

Four Makes Compete in French Grand Prix

PARIS, June 10 (*by mail*)—Having united only 12 entries, the annual French Grand Prix race, on Miramas track, near Marseilles, June 27, will not be run in heats and finals, as originally announced, but will be a 310 mile speed test starting at 2 o'clock in the afternoon. This is the shortest distance ever adopted for the French race.

Miramas, which is a 3/10 mile track having a certain resemblance to Indianapolis, will have a couple of U-shaped loops, built at the end of each straightaway, thus obliging the competitors to drop from maximum to about 30 miles an hour twice per lap. This change was made at the last moment.

Talbot, Delage, Bugatti and Sima-Violet, the four competitors, are all presenting entirely new cars. Talbot and Delage will race with supercharged straight-eights. Bugatti will race with his present type of 122 in. straight-eight having a reduced stroke to bring it into the 91½ in. class. A supercharger probably will be added. Sima-Violet will race with a four-cylinder double flat twin two-stroke having a rotary distributor. The cars have been designed to take a supercharger, but owing to lack of time it is quite probable that this will not be used in the French Grand Prix.

To complete the program, which is somewhat light with only twelve cars, the French Grand Prix will be preceded on the morning of June 27 by a light car and cycle car race for engines of 1100, 750 and 500 cc. Late in the evening of the same day the start will be given the six day race for the Ansaldo Cup.

Calendar of Coming Events

SHOWS

BrusselsDec.
Buenos AiresDec. 7-20
Ninth Argentine Automobile Show,
Palermo Park.
ChicagoSept. 20-24
National Steel and Mechanical Tool
Exposition, Municipal Pier, American
Society for Steel Treating.
ChicagoNov. 8-13
Coliseum, Automotive Equipment As-
sociation.
ChicagoNov. 15-19
Hotel Sherman, National Standard
Parts Association.
ChicagoJan. 29-Feb. 5
National, Coliseum, National Auto-
mobile Chamber of Commerce.
ClevelandOct. 4-8
Public Auditorium and Annex, Amer-
ican Electric Railway Association.
LimaJuly 28
First Peruvian Automobile Show,
under auspices Peruvian Touring
Club.
LondonOct. 4-9
Olympia Motor Cycle.
LondonOct. 21-30
MilanSept. 6-13
Fifth International Road Congress
and Exposition.

New HavenSept. 7-10
Machine Tool Exhibition.
New York CitySept. 13-18
Madison Square Garden, Radio Man-
ufacturers Show Association.
New YorkJan. 8-15
National, Grand Central Palace, Na-
tional Automobile Chamber of Com-
merce.
ParisOct. 7-17
Auto Salon, Grand Palais.
PragueSept.

CONVENTIONS

American Electric Railway Association,
Public Auditorium and Annex, Cleve-
landOct. 4-8
American Society for Steel Treating,
Municipal Pier, ChicagoSept. 20-24
Associated Manufacturers of Fabric
Auto Equipment, Inc., La Salle
Hotel, ChicagoNov. 13
Automotive Equipment Association, Col-
iseum, ChicagoNov. 8-13
National Association of Automobile Show
and Association Managers, Drake
Hotel, ChicagoJuly 27-28
National Battery Manufacturers Asso-
ciation, Roosevelt Hotel, New York
CityJune 25-26

National Standard Parts Association,
Hotel Sherman, ChicagoNov. 15-19
National Tire Dealers Association, Inc.,
Memphis, Tenn.Nov. 16-18

S. A. E. MEETINGS

National

Boston, Nov. 16-18, National Transportation
and Service.
Chicago, Sept. 21-23, Production Engineer-
ing, Hotel Sherman.
Philadelphia, Sept. 2-3, Aeronautical.

RACES

AltoonaSept. 6
Atlantic CityJuly 17
Atlantic CitySept. 25
Charlotte, N. C.Aug. 23
Dallas, TexasNov. 11
Laurel, Md.Oct. 23
Los AngelesNov. 25
MarseillesJune 27
French Grand Prix, Miramas Track.
Salem, N. H.July 5
Salem, N. H.Oct. 12